# United States Department of the Interior
# Bureau of Land Management

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# Environmental Assessment
# Marys River Oil and Gas Exploration Project

DOI-BLM-NV-E030-2013-0007-EA

File Number: NVN-088625, NVN-088620, NVN-081212, NVN-086576
NVN-088623


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June 2014

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## MISSION STATEMENT

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## List of Abbreviations and Acronyms

| | |
|---|---|
| µg/$m^3$ | micrograms per cubic meter |
| ADT | average daily traffic |
| af/yr | acre-feet per year |
| amsl | above mean sea level |
| AO | Authorized Officer |
| APDs | Applications for Permit-to-Drill |
| APE | Area of Potential Effect |
| AQRVs | Air Quality Related Values |
| Aqua Program | Aquifer Quality Assessment Program |
| AUMs | animal unit months |
| BAPC | Bureau of Air Pollution Control |
| BAQP | Bureau of Air Quality Planning |
| BBCS | Bird and Bat Conservation Strategy |
| BBS | Breeding Bird Survey |
| BCC | Birds of Conservation Concern |
| BCR | Bird Conservation Regions |
| BEA | Bureau of Economic Analysis |
| BGEP | Bald and Golden Eagle Protection Act |
| BLM | Bureau of Land Management |
| BLS | Bureau of Labor Statistics |
| BMPs | Best Management Practices |
| BOPE | Blowout Preventer Equipment |
| Brennan | J.C. Brennan & Associates, Inc. |
| BSCs | biological soil crusts |
| BTEX | benzene, toluene, ethyl benzene, and xylene |
| BWQP | Bureau of Water Quality Planning |
| CAS | Chemical Abstract Service |
| CASTNET | Clean Air Status and Trends Network |
| CESAs | Cumulative Effects Study Areas |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| cfs | cubic feet per second |
| $CH_4$ | methane |
| CMP | Comprehensive Management and Use Plan |
| CNHT | California National Historic Trail |
| CO | carbon monoxide |
| $CO_2$ | carbon dioxide |
| $CO_2e$ | carbon dioxide equivalent |
| COAs | Conditions of Approval |
| CPRR | Central Pacific Railroad |
| CR | County Road |
| CRA | Cultural Resource Analysts, Inc. |
| CSPRR | Central and Southern Pacific Railroad |
| dB | decibels |
| DOI | U.S. Department of the Interior |
| DPS | Distinct Population Segment |
| DRI | Desert Research Institute |
| EA | Environmental Assessment |
| EIA | Energy Information Administration |
| EIS | Environmental Impact Statement |
| EO | Executive Order |
| EPA | U.S. Environmental Protection Agency |
| ESA | Endangered Species Act |
| $^oF$ | degrees Fahrenheit |

| | |
|---|---|
| FEMA | Federal Emergency Management Agency |
| FLMs | Federal Land Managers |
| FLPMA | Federal Land Policy and Management Act |
| FML | federal mineral lease |
| FMUs | Fire Management Units |
| GHGs | greenhouse gases |
| GIS | Geographic Information System |
| GWP | Global Warming Potential |
| $H_2S$ | hydrogen sulfide |
| HAPs | hazardous air pollutants |
| HUC | Hydrologic Unit Code |
| HWA | Hayden-Wing Associates |
| IDA | International Dark-Sky Association |
| IDT | Interdisciplinary Team |
| IMPROVE | Interagency Monitoring of Protected Visual Environments |
| JBR | JBR Environmental Consultants, Inc. |
| KCL | potassium chloride |
| km | kilometer |
| LIDAR | light detection and ranging |
| MAG | magnesium chloride |
| MBTA | Migratory Bird Treaty Act |
| MLA | Mineral Leasing Act |
| MOA | Memorandum of Agreement |
| MOU | Memorandum of Understanding |
| mph | miles per hour |
| MSDS | Material Data Safety Sheets |
| MSUPO | Master Surface Use Plan of Operations |
| MWD | measurement while drilling |
| NAAQS | National Ambient Air Quality Standards |
| NAC | Nevada Administrative Code |
| NADP | National Acid Deposition Program |
| NAGPRA | Native American Graves Protection and Repatriation Act |
| NAIP | National Agricultural Imagery Photography |
| NDEP | Nevada Division of Environmental Protection |
| NDETR | Nevada Department of Employment, Training and Rehabilitation |
| NDOA | Nevada Department of Agriculture |
| NDOM | Nevada Division of Minerals |
| NDOT | Nevada Department of Transportation |
| NDOW | Nevada Department of Wildlife |
| NDT | Nevada Department of Taxation |
| NDWR | Nevada Division of Water Resources |
| NEPA | National Environmental Policy Act |
| Nevada AAQS | Nevada Ambient Air Quality Standards |
| NGSCT | Nevada Governor's Sage-grouse Conservation Team |
| NHPA | National Historic Preservation Act |
| NNHP | Nevada Natural Heritage Program |
| $NO_2$ | nitrogen dioxide |
| NOx | nitrogen oxides |
| Noble | Noble Energy, Inc. |
| NPS | National Park Service |
| NRC | Nuclear Regulatory Commission |
| NRCS | Natural Resources Conservation Service |
| NRHP | National Register of Historic Places |
| NRS | Nevada Revised Statutes |
| NSDO | Nevada State Demographer's Office |
| NTN | National Trends Network |

| | |
|---|---|
| NTSA | National Trails System Act |
| NTT | National Technical Team |
| NWI | National Wetland Inventory |
| NWS | National Weather Service |
| $O_3$ | ozone |
| OCTA | Oregon and California Trails Association |
| OHV | off-highway vehicle |
| PFYC | Potential Fossil Yield Classification |
| PGH | Preliminary General Habitat |
| $PM_{10}$ | particulate matter less than 10 microns in effective diameter |
| $PM_{2.5}$ | particulate matter less than 2.5 microns in effective diameter |
| PMU | Population Management Unit |
| PPH | Preliminary Priority Habitat |
| ppm | parts per million |
| PSD | Prevention of Significant Deterioration |
| PVC | polyvinyl chloride |
| RCRA | Resource Conservation and Recovery Act |
| RFFAs | Reasonably Foreseeable Future Actions |
| RMP | Resource Management Plan |
| ROW | Right-of-Way |
| RV | recreational vehicle |
| SAD | Surface Area Disturbance |
| SHPO | State Historic Preservation Officer |
| $SO_2$ | sulfur dioxide |
| SOx | sulfur oxides |
| SPRR | Southern Pacific Railroad |
| SR | State Route |
| SVR | Standard Visual Range |
| tpy | tons per year |
| TRMP | Trails Regional Mitigation Plan |
| UIC | Underground Injection Control |
| UPRR | Union Pacific Railroad |
| USC | United States Code |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| VFD | Volunteer Fire Department |
| VIEWS | Visibility Information Exchange Web System |
| VOCs | volatile organic compounds |
| VRM | Visual Resource Management |
| WCRM | Western Cultural Resource Management, Inc. |
| WRCC | Western Regional Climate Center |

# CHAPTER 1 - INTRODUCTION

## 1.1 IDENTIFYING INFORMATION

**BACKGROUND:**

In October 2012, Noble Energy, Inc. (Noble) submitted to the Bureau of Land Management (BLM) a Master Surface Use Plan of Operations (MSUPO) for the proposed Marys River Oil and Gas Exploration Project (Project or Proposed Action). The MSUPO was updated in January 2013, March 2014, and May 2014 (Noble, 2014). The Proposed Action is for a maximum of 20 wells on up to 20 well pads including construction, drilling, completion, production/operation, and abandonment. Because this is an exploration program, Noble has identified 33 potential well pad locations within the Project Area; however, no more than 20 well pad locations would be constructed over a period of two or more years. During the fall of 2012, Noble conducted a 3D Seismic program within the Marys River Project Area. Noble would use the results of the seismic program, previous 2D geothermal seismic programs, and previous well results from the Project Area to select locations that minimize the likelihood of encountering drilling hazards and increase the understanding of faults which may act as a conduit for fluids in the reservoir.

During the first year, Noble proposes to either construct two well pads (each well pad with one production well and one seismic listening well) or four well pads with one production well on each pad. The seismic listening wells may later be converted to production wells. The remainder of the well pads and wells (up to 20 well pads and 20 wells) would be constructed during the following years. The wells would be produced for an estimated 20 years. Within the Project Area, existing roads would be used, some roads would require upgrading, and new local and resource roads would be required to access the well pads. Noble has identified 33 potential well pad locations within the Project Area; however, no more than 20 well pads would be constructed. The Proposed Action would begin once all permits and approvals are obtained.

**NUMBER:** DOI-BLM-NV-E030-2013-0007-EA

**CASEFILE/PROJECT NUMBER:** NVN-088625, NVN-088620, NVN-081212, NVN-086576, NVN-088623

**PROJECT NAME:** Noble Energy – Marys River Oil and Gas Exploration Project

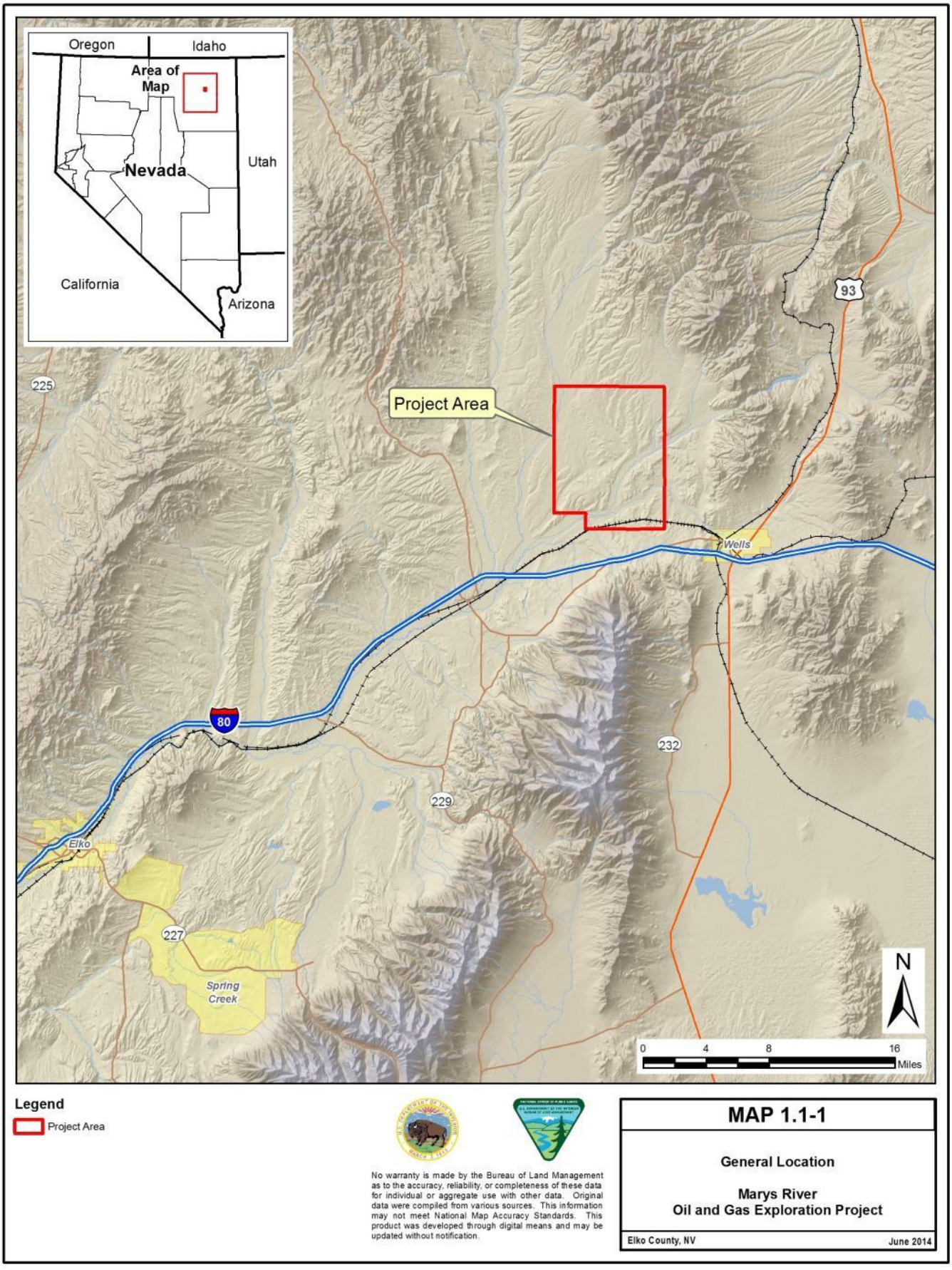
**PLANNING UNIT:** Elko District, Wells Field Office

### 1.1.1 PROJECT LOCATION

The Project Area is located in Elko County, Nevada approximately 4 miles northwest of Wells and approximately 36 miles northeast of Elko on the north side of Interstate-80. General access to the Project Area from Elko and Wells is via Interstate-80 to Starr Valley Road (State Route - SR 230/Exit 333) and proceeding north on county roads (see Map 1.1-1). Access is described in detail in the Transportation Plan (Appendix A).

### 1.1.2 SURFACE AND MINERAL OWNERSHIP

The Marys River Project Area encompasses approximately 39,444 acres in Elko County. Surface and mineral ownership within the Project Area is shown in Table 1.1-1. Surface ownership is provided on Map 1.1-2.




**Legend**

Project Area

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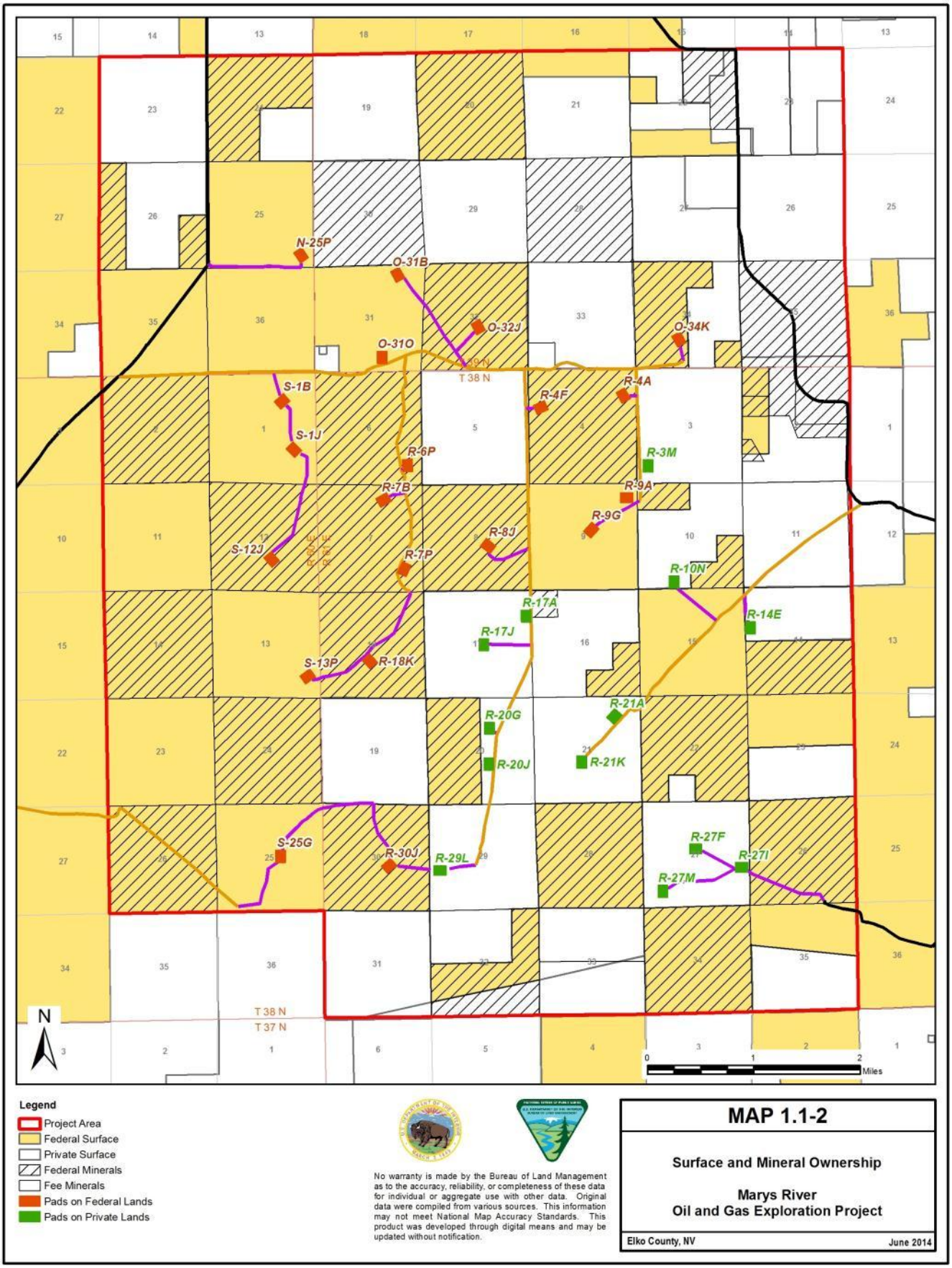
## MAP 1.1-1

**General Location**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014




**Legend**

- Project Area
- Federal Surface
- Private Surface
- Federal Minerals
- Fee Minerals
- Pads on Federal Lands
- Pads on Private Lands

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## MAP 1.1-2

**Surface and Mineral Ownership**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014

**Table 1.1-1**
**Surface and Mineral Ownership in the Project Area**

| Surface/Mineral Ownership | Area (acres) | Percent |
|---|---|---|
| Federal/Federal | 13,410 | 34.0 |
| Private/Federal | 2,606 | 6.6 |
| Private/Private | 15,335 | 38.9 |
| Federal/Private | 8,093 | 20.5 |
| **Total** | **39,444** | **100.0** |

### 1.1.3 NAME AND LOCATION OF PREPARING OFFICE:

BLM Wells Field Office, Elko District, Nevada

## 1.2 PURPOSE AND NEED

The purpose of the Proposed Action is for Noble to explore for oil and gas to verify the resources within the Project Area.

The need for the Proposed Action stems from the BLM's legal responsibility to respond to Noble's MSUPO (Noble, 2014) for oil and gas exploration under its mandate to manage public lands according to the Federal Land Policy and Management Act (FLPMA) and the Mineral Leasing Act (MLA), as amended.

## 1.3 PLAN CONFORMANCE REVIEW

The Proposed Action is subject to and has been reviewed for conformance with the following plan (43 Code of Federal Regulations (CFR) 1610.5, BLM 1617.3):

The Proposed Action is in conformance with the Wells Resource Management Plan (RMP – BLM, 1983), as approved June 23, 1985. The Record of Decision for the Wells RMP, page 25, provides that, "The public lands will be managed in a manner which recognizes the Nation's needs for domestic sources of minerals." As a standard operating procedure, the RMP prescribes that, "Time-of-day and/or time-of-year restrictions will be placed on construction activities associated with leasable and saleable mineral explorations and/or development that are in the immediate vicinity or would cross crucial sage-grouse, crucial deer and pronghorn antelope winter habitats, antelope kidding areas, or raptor nesting areas." The Proposed Action is also in conformance with all amendments to the Wells RMP.

## 1.4 PUBLIC PARTICIPATION

### 1.4.1 SCOPING

As part of the National Environmental Policy Act (NEPA) process, a news release was published, outlining the Proposed Action as well as the BLM's intent to prepare an Environmental Assessment (EA) analyzing the proposal. The proposal, the news release, and a map were posted to the BLM Elko District website at www.blm.gov/rv5c. Letters were sent to interested parties soliciting input on potential issues, impacts, and alternatives. Tribal consultation letters were sent to 10 tribes and four non-governmental organizations notifying them of the Proposed Action and requesting input. The BLM invited the public to provide comments on the proposal for 30 days beginning December 6, 2012. The public comment period ended on January 4, 2013. Following the scoping period, on March 14, 2013, BLM held a public forum in Elko to address hydraulic fracturing related to oil and gas exploration.

### 1.4.2 PUBLIC SCOPING COMMENTS

During the comment period, six comment letters were received: two from state agencies, two from environmental advocacy groups, and two from private individuals. Comments were categorized by topic and each comment was given an identification number. Comments received during the public comment period are summarized below and were considered during the impact analysis.

**Air Quality.** Comments expressed concern that emissions will affect air quality. One comment cited potential impacts to climate change.

**General.** General comments recommended preparing an Environmental Impact Statement (EIS), rather than an EA, to assess all environmental and human health impacts. An evaluation of all reasonable alternatives was requested. Comments identified missing or confusing information in the MSUPO.

**Geology and Soils.** Concern was expressed over geological implications from hydraulic fracturing, and seismic effects and impacts to subsurface geology from drilling. Information was requested regarding the source of soil for burying drill cuttings.

**Hazardous Materials.** Information was requested on hydraulic fracturing fluid composition, use of sand as a proppant, use of radioactive tracers, handling of drilling mud and cuttings, handling of normally occurring radioactive material excavated through the bore hole, and an explanation of a closed-loop system.

**Socioeconomics.** Commenter recommended making every effort to assure the safety of families living in the Project Area.

**Visual Resources.** Concern was expressed regarding mitigation of lighting impacts. Suggestions were made regarding minimizing visual impacts through use of screening, appropriate structure colors, and careful site placement, as well as avoidance of new roads when possible.

**Vegetation.** The seed mix was requested and information was requested regarding root structures of local vegetation.

**Wildlife.** Comments expressed concern over potential impacts to sage-grouse and other species (pygmy rabbits, pronghorn, and burrowing owls) living in the sagebrush community. Recommendations were made to minimize impacts to pronghorn, pygmy rabbits, and golden eagles. Concern was expressed over the potential for poaching. Comments suggested a more thorough evaluation of the current status of wildlife populations compared with historic or potential habitat capacity.

**Wetland and Water Resources.** Concern was expressed regarding possible impacts to wetlands and riparian communities associated with the upper Humboldt River in the Project Area. Additional information was requested regarding use of polluted water for agricultural purposes, water quality impacts from hydraulic fracturing, the use of treatment facilities, monitoring of potential water impacts, and extraction, storage, and disposal of produced water.

### 1.4.3 INTERNAL SCOPING

Internal scoping meetings for the Project were held with the BLM Wells Field Office Interdisciplinary Team (IDT). Maps of the Project Area and description of the Proposed Action were distributed to the IDT and discussed at IDT meetings. Screening of potential impacts to resources was conducted through internal scoping and site visits. Table 3.1-1 in Chapter 3 lists the results of the initial screening process.

### 1.4.4 PUBLIC COMMENT

A news release seeking public comment on the preliminary EA was posted on the BLM Elko website at: http://www.blm.gov/nv/st/en/fo/elko_field_office.html on March 24, 2014. The Preliminary EA was also posted. The BLM invited the public to provide comments on the EA for 30 days beginning March 24, 2014 through April 23, 2014. Three letters were received from federal agencies including the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the National Park Service. One letter was received from the Nevada Department of Transportation. Two letters were received from environmental advocacy groups including the Center for Biodiversity and Western Watersheds. Eight letters of general support were received from Business and Industry. Thirty-nine letters were received from individuals, some opposing the Project and some in support of the Project. Responses to substantive comments are provided in Appendix B.

## 1.5 DECISIONS TO BE MADE

The BLM's authority for approving oil and gas exploration is listed in 43 CFR 3151. The BLM's approval of oil and gas activities is subject to conditions to prevent undue or unnecessary degradation of public lands and is consistent with the 1985 Wells RMP and the District-wide EA for oil and gas leasing completed in September 2005 (BLM, 2005).

This EA was prepared in conformance with the policy guidance provided in the BLM's NEPA Handbook H-1790-1 (BLM, 2008a). The BLM Handbook provides instructions for compliance with the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (40 CFR §1500-1508) and the U.S. Department of the Interior (DOI) Manual 516 DM 1-7 on NEPA compliance (DOI, 2005).

The BLM decision-makers will decide, based on the analysis contained in this EA, whether or not to authorize the Project with Conditions of Approval (COAs). The Decision Record associated with this EA will not constitute the final approval for any actions, such as approval of all individual Applications for Permit-to-Drill (APDs), Rights-of-Ways, and Sundry Notices associated with the Proposed Action. It does, however, provide the BLM Authorized Officer (AO) with information upon which to consider approving individual project components such as APDs, Rights-of-Ways, and Sundry Notices.

## 1.6 FEDERAL, STATE AND LOCAL PERMITS OR APPROVALS

Permits and approvals that may be required for the Project are listed in Table 1.1-2.

**Table 1.1-2**
**Required Permits and Approvals**

| Permits and Approvals | Agency |
|---|---|
| BLM Right-of-Way Grant (SF 299 Application) | Bureau of Land Management |
| Temporary Use of BLM Administered Land | Bureau of Land Management |
| Use of BLM Administered Land | Bureau of Land Management |
| BLM Permit to Drill | Bureau of Land Management |
| Completion Report | Bureau of Land Management |
| Elko County Road Maintenance Agreement | Elko County Roads Department |
| Elko County approval for road and bridge use | Elko County Roads Department |
| Housing Facilities Permit | Nevada Bureau of Health Protection Services, Health Division |
| Permit to Drill an Oil or Gas Well | Nevada Commission on Mineral Resources, Division of Minerals |
| Well Completion Report | Nevada Division of Minerals |
| Oilfield Water Production and Disposal Well | Nevada Department of Environmental Protection (NDEP) |
| Air Quality Operating Permit | NDEP Bureau of Air Pollution Control |
| Surface Area Disturbance Permit | NDEP Bureau of Air Pollution Control |
| Transient Non-Community Public Drinking Water System Permit | NDEP Bureau of Safe Drinking Water |
| Permit to install domestic wastewater holding tanks at on-site temporary crew quarters | NDEP Bureau of Water Pollution Control |
| Over-Dimensional Vehicle Permit | Nevada Department of Transportation |
| Water Well Drilling Permit Waiver | Nevada Division of Water Resources |
| Water Use Permit | Nevada State Engineer |

# CHAPTER 2 - PROPOSED ACTION AND ALTERNATIVES

## 2.1 INTRODUCTION

The purpose of this chapter is to describe the Proposed Action as well as alternatives, both those analyzed in detail and those considered but not analyzed in detail. Alternatives analyzed in detail include the Proposed Action Alternative, the No Action Alternative, and a Visual Alternative. Under the Proposed Action Alternative, Noble has identified 33 well pads and associated access roads for construction; however, no more than 20 well pads would be constructed. Under the No Action Alternative, none of the identified well pads and associated access roads would be constructed. Under the Visual Alternative, six of the 33 well pads identified in the Proposed Action are not included and measures are added to reduce indirect visual adverse effects to 13 well pads resulting from the Proposed Action. No alternatives were identified that were considered but not analyzed in detail.

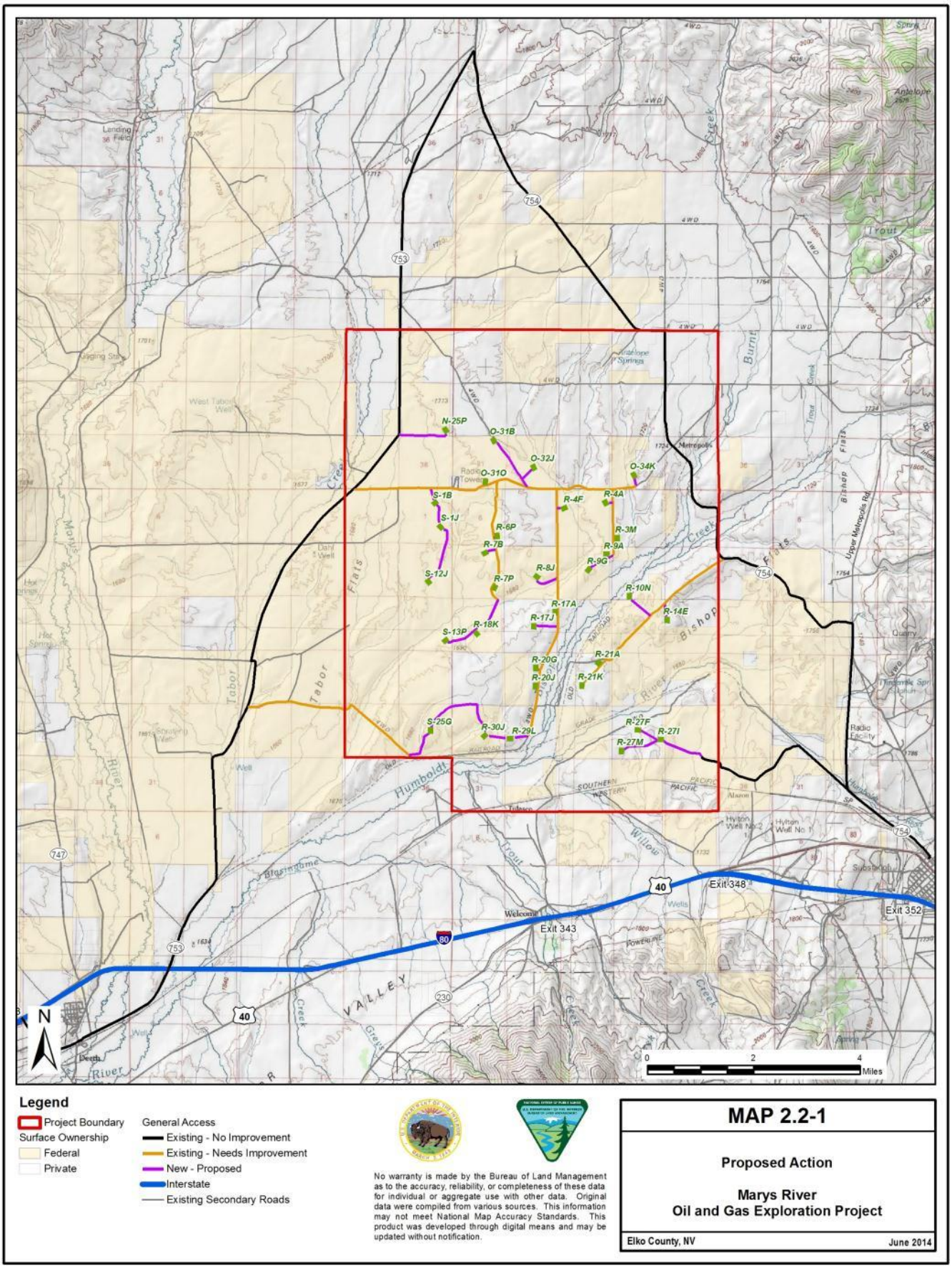
## 2.2 ALTERNATIVES ANALYZED IN DETAIL

### 2.2.1 PROPOSED ACTION

Under the Proposed Action, Noble would conduct an oil and gas exploratory drilling program in the Marys River Project Area. The Project would include two phases; Construction/Drilling and, if economic reserves are discovered, Production/Operations. The Construction/Drilling Phase includes construction of up to 20 well pads and drilling and completion of a maximum of 20 exploration wells over two or more years. The Construction/Drilling Phase also includes construction of new local and resource roads and upgrading of existing local and resource roads. During this phase, Noble would drill on-site water supply wells and, if economic reserves are discovered, potentially construct a disposal/injection well. Water supply and disposal/injection wells would be constructed on one of the identified 20 well pads. All of the surface disturbance associated with the Project would occur during the Construction/Drilling Phase (see Map 2.2-1). The Construction/Drilling Phase is described in detail below.

If wells produce economic quantities of oil, Noble would produce (operate) the wells for up to 20 years in the Production/Operations Phase. No additional surface disturbance would occur during the Production/Operations Phase. Details regarding the Production/Operations Phase are provided below. If drilling results in an unproductive well, the well would be plugged and abandoned in compliance with Federal Onshore Oil and Gas Orders and State of Nevada regulations within 90 days of well completion, weather permitting.

All phases of the Proposed Action would be in accordance with the Project Design Features and Best Management Practices (BMPs) provided in Noble's MSUPO (Noble, 2014). The MSUPO also includes a Transportation Plan, Typical Drawings, Narrative of Completion and Stimulation, the Memorandum of Understanding (MOU) for the Aquifer Quality Assessment Program – Aqua Program, Marys River Reclamation Plan, Marys River Integrated Weed Management Plan, and Fire Prevention Plan Measures (Appendices A, D, E, F, G, H, and J to this EA, respectively). BMPs for Sage-Grouse, a Master Drilling Plan, and a Field-Wide Stormwater Pollution Prevention Plan are also included in the MSUPO. The Proposed Action would comply with all applicable Federal Onshore Oil and Gas Orders and all other applicable permits and approvals. Noble would be required to adhere to stipulations protecting sensitive resources that are included on federal leases.




**Legend**

Project Boundary

Surface Ownership
- Federal
- Private

General Access
- Existing - No Improvement
- Existing - Needs Improvement
- New - Proposed
- Interstate
- Existing Secondary Roads

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## MAP 2.2-1

**Proposed Action**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014

#### 2.2.1.1 Construction/Drilling Phase

The Construction/Drilling Phase includes well pad construction, well drilling and completion, and construction and upgrading of access roads over two or more years. During the fall of 2012, Noble conducted a 3D Seismic survey within the Marys River Project Area. The purpose of the 3D Seismic survey was to allow Noble to select well pad locations. Noble will use the results of the 3D Seismic survey, previous 2D geothermal seismic programs, and previous well results within the Project Area to select well pad locations that minimize the likelihood of encountering drilling hazards and faults which may act as a conduit for fluids in the reservoir. The seismic data would also be used to select locations which allow for separation of the hydrocarbon-bearing zones from any potential water resources of the state.

Noble has identified 33 potential well pad locations; however, no more than 20 of the well pad locations would be constructed under the Proposed Action. During the first year, Noble would either construct two well pads (each one with one production well and one seismic listening well) or four well pads with one production well on each pad. The seismic listening wells, if drilled, may later be completed as production wells.

During the second or following years, 16 well pads with 16 wells (one well per pad) may be constructed. These wells may be vertical or directional, with up to four of the proposed 16 wells drilled as horizontal wells depending on the results of other well tests.

Table 2.2-1 provides a list of the 33 potential well pads, their location, and surface and mineral ownership. Table 2.2-2 provides a list of the federal leases that could be potentially affected by the Proposed Action, the well pads that would apply to the lease, and a summary of the stipulations for each lease. Lease stipulations include protections for special status species, wildlife, and historic trails (see Table 2.2-2). A full listing of the federal lease stipulations is provided in Appendix C.

**Table 2.2-1**
**Potential Well Pad Locations with Surface and Mineral Ownership under the Proposed Action**

| Well Pad Name | T | R | Sec | Surface Qtr/Qtr | Surface Ownership | Mineral Ownership |
|---|---|---|---|---|---|---|
| N-25P | 39N | 60E | 25 | SESE | Federal | Private |
| O-31B | 39N | 61E | 31 | NWNE | Federal | Private |
| O-32J | 39N | 61E | 32 | NWSE | Federal | Federal |
| O-31O | 39N | 61E | 31 | SWSE | Federal | Private |
| S-1B | 38N | 60E | 1 | SWNE | Federal | Private |
| S-1J | 38N | 60E | 1 | NESE | Federal | Private |
| S-12J | 38N | 60E | 12 | NWSE | Federal | Federal |
| R-6P | 38N | 61E | 6 | SESE | Federal | Federal |
| R-7P | 38N | 61E | 7 | SESE | Federal | Federal |
| S-13P | 38N | 60E | 13 | SESE | Federal | Private |
| R-18K | 38N | 61E | 18 | NESW | Federal | Federal |
| R-4F | 38N | 61E | 4 | SWNW | Federal | Federal |
| R-4A | 38N | 61E | 4 | NENE | Federal | Federal |
| O-34K | 39N | 61E | 34 | SESW | Federal | Federal |
| R-9A | 38N | 61E | 9 | NENE | Federal | Private |
| R-9G | 38N | 61E | 9 | SWNE | Federal | Private |
| R-8J | 38N | 61E | 8 | NWSE | Federal | Federal |
| S-25G | 38N | 60E | 25 | NWSE | Federal | Private |
| R-30J | 38N | 61E | 30 | NWSE | Federal | Federal |
| R-7B | 38N | 61E | 7 | NWNE | Federal | Federal |
| R-29L | 38N | 61E | 29 | NWSW | Private | Private |

| Well Pad Name | T | R | Sec | Surface Qtr/Qtr | Surface Ownership | Mineral Ownership |
|---|---|---|---|---|---|---|
| R-27M | 38N | 61E | 27 | SWSW | Private | Private |
| R-27F | 38N | 61E | 27 | SENW | Private | Private |
| R-27I | 38N | 61E | 27 | NESE | Private | Private |
| R-20J | 38N | 61E | 20 | NWSE | Private | Private |
| R-20G | 38N | 61E | 20 | SWNE | Private | Private |
| R-21K | 38N | 61E | 21 | NESW | Private | Private |
| R-21A | 38N | 61E | 21 | NENE | Private | Private |
| R-17J | 38N | 61E | 17 | NWSE | Private | Private |
| R-17A | 38N | 61E | 17 | NENE | Private | Private |
| R-14E | 38N | 61E | 14 | SWNW | Private | Private |
| R-10N | 38N | 61E | 10 | SESW | Private | Private |
| R-3M | 38N | 61E | 3 | SWSW | Private | Private |

**Table 2.2-2**
**Proposed Well Pads and Lease Stipulations by BLM Lease Number[1,2]**

| Federal Lease Number | Effective Lease Date | Well Pad Name | Lands Included in Lease | Lease Stipulation |
|---|---|---|---|---|
| NVN88625 | 07/01/2010 | O-32J<br>O34-K | T39N R61E<br>Section 32<br>Parcel<br>NV-10-06-139 | ESA – Section 7 Consultation<br>T&E and Sensitive Species<br>Raptor Nesting Sites<br>Cultural Resources<br>Sage-Grouse Brood Rearing Areas |
| NVN88620 | 07/01/2010 | S-12J | T38N R60E Section 12<br>Parcel<br>NV-10-06-134 | ESA – Section 7 Consultation<br>T&E and Sensitive Species<br>Raptor Nesting Sites<br>Cultural Resources<br>Pronghorn Antelope Crucial Winter Range<br>Sage-Grouse Brood Rearing Areas |
| NVN81212 | 05/01/2013 | R-4F<br>R-4A | T38N R60E<br>Section 4<br>NV-05-12-655 | ESA – Section 7 Consultation<br>T&E and Sensitive Species<br>Raptor Nesting Sites<br>Cultural Resources |
| NVN86576 | 2/1/2009 | R-6P<br>R-7B<br>R-7P<br>R-8J | T38N R61E, Sec 6, 7, 8<br>Parcel<br>NV-10-06-135 | ESA – Section 7 Consultation<br>T&E and Sensitive Species<br>Raptor Nesting Sites<br>Cultural Resources<br>Pronghorn Antelope Crucial Winter Range<br>Congressionally Designated Historic Trails |
| NVN88623 | 07/01/2010 | R-18K | T38N R61E, Sec 16, 18<br>Parcel<br>NV-10-06-137 | ESA – Section 7 Consultation<br>T&E and Sensitive Species<br>Raptor Nesting Sites<br>Cultural Resources<br>Pronghorn Antelope Crucial Winter Range<br>Sage-Grouse Brood Rearing Areas<br>Congressionally Designated Historic Trails |

[1] Of the potential 33 identified well pad locations, 13 are on private lands with private minerals, 9 are on federal lands with private minerals, and 11 are on federal lands with federal minerals (see Table 2.2-1).
[2] Proposed well pad R-30J is located on a pending oil and gas lease (NVN92168).

#### 2.2.1.1.1 Surface Disturbance by Wellfield Component

Table 2.2-3 provides estimates of short-term and long-term disturbance for each wellfield component, such as well pads and roads. Short-term disturbance includes all disturbances for well pads and roads which would occur during the Construction/Drilling Phase (expected to last for 2 years). Long-term disturbance is that portion of the short-term disturbance remaining during the Production/Operations Phase and would persist for the life of the Project, estimated to be 20 years, but would last for as long as the well produces economic quantities of oil.

Areas disturbed during the Construction/Drilling Phase, but not needed for the Production/Operations Phase, would be recontoured and reseeded during interim reclamation. During interim reclamation, temporary road disturbances and a portion of the well pad would be reclaimed immediately after construction (see Transportation Plan, Appendix A). The estimates of disturbance in Table 2.2-3 include surface disturbances on BLM-administered lands and on private lands. Approximately 65 percent of all potential disturbance (20 well pads) could occur on BLM-administered lands (surface) and 35 percent (13 well pads) could occur on private surface. Actual disturbance would be less than the identified disturbance because no more than 20 of the 33 identified well pad locations would be constructed (see Table 2.2-4).

**Table 2.2-3**
**Identified Potential Short-Term and Long-Term Surface Disturbance as a Result of Oil and Gas Exploration under the Proposed Action**

| Component | Potential Length or Number of Sites | Potential Short-Term Surface Disturbance (acres)[7] | | | Potential Long-Term Surface Disturbance (acres)[7] | | |
|---|---|---|---|---|---|---|---|
| | | Federal | Private | Total | Federal | Private | Total |
| Well Pads[1,2] | 33 | 140.2 | 91.1 | 231.3 | 100.0 | 65.0 | 165.0 |
| New Resource Roads[3] | 7.2 miles | 21.1 | 6.7 | 27.8 | 14.4 | 4.6 | 19.0 |
| Upgrade Resource Roads[3] | 0.4 miles | 0.0 | 1.4 | 1.4 | 0.0 | 1.0 | 1.0 |
| Turnouts[4] | 7 | 0.0 | 0.0 | 0.0 | 0.7 | 0.3 | 1.0 |
| New Local Roads[5] | 5.4 miles | 24.0 | 1.4 | 25.4 | 17.6 | 1.0 | 18.6 |
| Upgrade Local Roads[5,6] | 20.1 miles | 62.2 | 33.7 | 95.9 | 46.3 | 25.2 | 71.5 |
| **Total** | | **247.5** | **134.3** | **381.8** | **179.0** | **97.1** | **276.1** |

[1] Noble identified 33 potential well pad locations and all 33 well pads are included with these estimates; however, no more than 20 of the 33 potential locations would be constructed (see Table 2.2-4). Eleven of the proposed well pads are identified on federal surface with federal minerals, nine are identified on federal surface with private minerals, and 13 are identified on private surface with private minerals.

[2] Short-term well pad disturbance before interim reclamation is estimated at 7 acres for the first six well pads and 6 acres for the remaining 14 well pads, but 7 acres is used here for all well pads. Long-term disturbance after interim reclamation could be up to 5 acres per well pad, but on average would be 3.5 acres.

[3] Based on 16 foot travel surface with 5 feet for ditches (2.5 feet on either side) for resource roads long-term disturbance. An additional 10 feet of temporary use area (short-term disturbance) would be required for construction. Disturbance would include blading and removal of vegetation.

[4] Turnouts would be 10 feet in width by 600 feet in length. Short-term disturbance is not noted for turnouts because it would be within the temporary disturbance for roads; however, it is noted as long-term disturbance.

[5] Upgrading existing local roads and constructing new local roads would have a 24 foot travel surface with 5 feet for ditches (2.5 feet on either side) representing long-term disturbance. An additional 10 feet of temporary use area (short-term disturbance) would be required for construction.

[6] Existing roads that require upgrading are approximately 12.7 feet wide. Existing disturbance (approximately 43.3 acres total) is not subtracted from the proposed disturbance footprint – all new disturbance is assumed.

[7] Total acres are taken from GIS disturbance footprint model and are not calculated by multiplying width times length divided by 43,560.

**Table 2.2-4**
**Actual Short-Term and Long-Term Surface Disturbance**
**as a Result of Oil and Gas Exploration under the Proposed Action[1]**

| Component | Potential Length or Number of Sites | Actual Short-Term Surface Disturbance (acres)[6] | Actual Long-Term Surface Disturbance (acres)[6] |
|---|---|---|---|
| Well Pads[1,2] | 20 | 126.0 | 100.0[2] |
| New Resource Roads[3] | 7.2 miles | 27.8 | 19.0 |
| Upgrade Resource Roads[3, 4] | 0.4 miles | 1.4 | 1.0 |
| Turnouts[5] | 7 | 0.0 | 1.0 |
| New Local Roads[3] | 5.4 miles | 25.4 | 18.6 |
| Upgrade Local Roads[3,4] | 20.1 miles | 95.9 | 71.5 |
| **Total** | | **276.5** | **211.1** |

[1] Actual estimated short-term and long-term disturbance cannot be divided between federal and private surface/minerals. The 20 selected well pads could occur on any combination of lands.
[2] Long-term disturbances would be up to 5.0 acres per well pad and would average 3.5 acres.
[3] Assumes all resource and local road construction and upgrades would be required.
[4] Existing roads that require upgrading are approximately 12.7 feet wide. Existing disturbance (approximately 43.3 acres total) is not subtracted from the proposed disturbance footprint – all new disturbance is assumed.
[5] Turnouts would be 10 feet in width by 600 feet in length. Short-term disturbance is not noted for turnouts because it would be within the temporary disturbance for roads; however, it is noted as long-term disturbance.
[6] Total acres are taken from GIS disturbance footprint model and are not calculated by multiplying width times length divided by 43,560.

## Well Pads

Noble has identified 33 potential well pad locations; however, no more than 20 of the 33 well pads would be constructed under the Proposed Action. Noble will use the results of the 3D Seismic program, previous 2D geothermal seismic programs, and previous well results from the Project Area to select locations for the 20 well pads. Noble would construct up to four well pads the first year and up to 16 well pads the second year and beyond. Noble estimates that constructing a new well pad would disturb approximately 7.0 acres for the first six well pads and 6.0 acres for the remaining 14 well pads. Well pad sizes vary because Noble would be able to reduce the size of the well pads once they have developed a few well pads and determined which techniques work best. The 20 selected well pads could occur on any combination of federal or private surface and minerals.

Well pads would be constructed from the native soil and rock materials present in the Project Area using a bulldozer, grader, front-end loader, or backhoe. Pads would be constructed by clearing vegetation, stripping and stockpiling topsoil, and leveling the pad area using cut-and-fill techniques. The tops of cut banks and pad corners may be rounded to improve their appearance. A typical drilling location for the first six well pads would be 535 feet by 555 feet (7.0 acres), which would allow enough space for cuts and fills, topsoil storage, and stormwater control BMPs (see Figure 2.2-1). The remaining well pads (up to 14) would not exceed 6 acres.

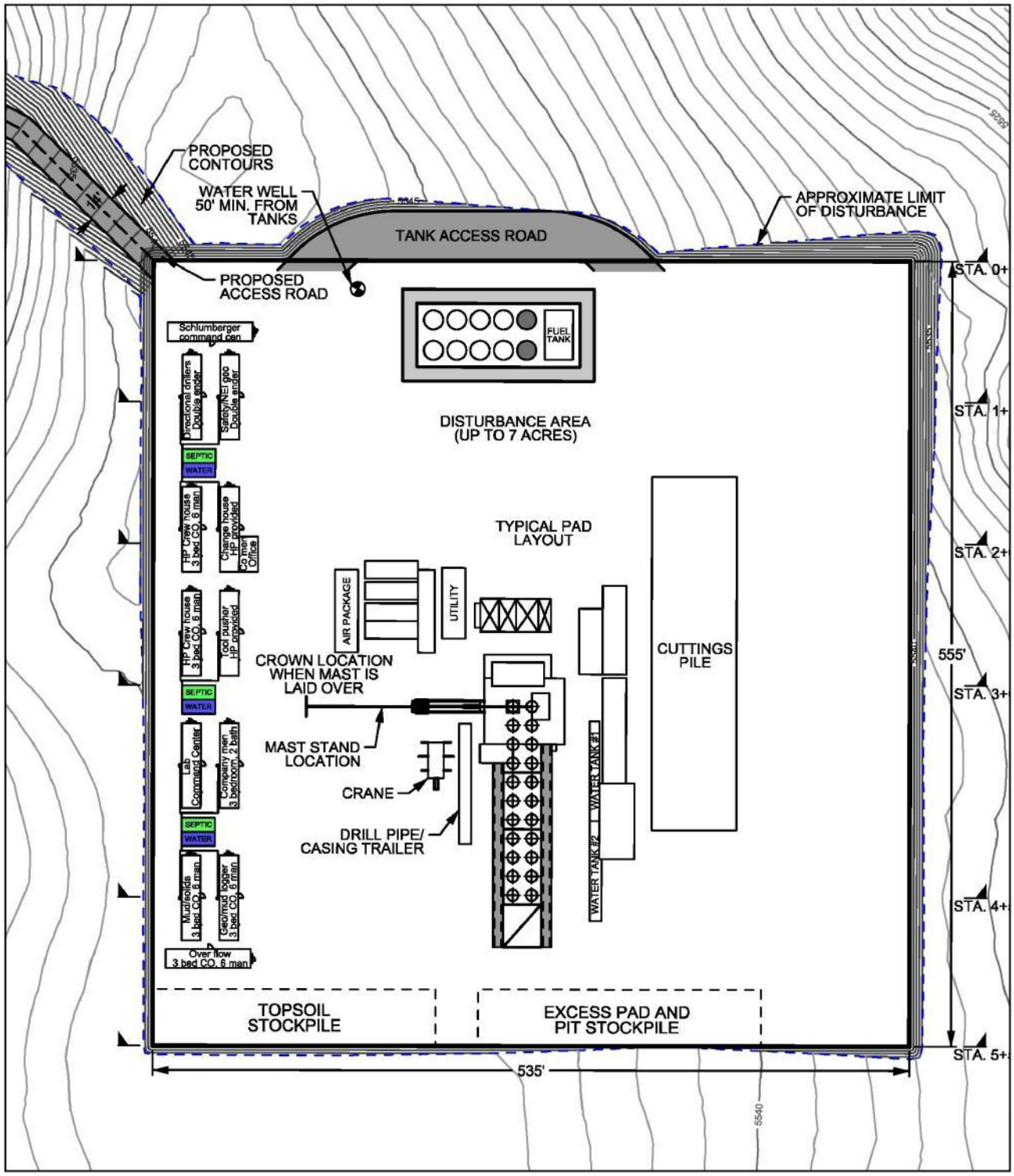


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**Figure 2.2-1**

**Typical Drilling Location**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014

**Roads**

Noble would use existing county roads to access the Project Area, and some Wells city streets to access the eastern portion of the Project Area (access routes are described above in Section 1.1.1). The Proposed Action includes construction of new local and resource roads within the Project Area and seven road turnouts. Up to 7.2 miles of new resource roads would generally require a 31-foot disturbance width. An additional 10 feet of temporary disturbance would be required during construction. Final road width would be 21 feet with a 16 foot running surface (see Figure 2.2-2). Approximately 5.4 miles of new local roads would generally require a 39-foot width for construction (including 10 feet of temporary disturbance). Disturbance would include blading and removal of vegetation. Final road width would be 29 feet with a 24 foot running surface (see Figure 2.2-3). Upgrading of up to 20.5 miles of existing two-track roads (18.5 miles within the Project Area and 2 miles outside the Project Area) would occur within and outside the disturbance of existing two-track roads. Noble has identified seven turnout locations where the visible distance on roads would be less than 1,000 feet. Each turnout would be approximately 10 feet wide by 600 feet long and would be within the temporary disturbance for road construction. The Transportation Plan (Appendix A) discusses the construction procedures and measures that Noble would use to upgrade existing roads and construct new roads.

For purposes of analysis, it is assumed that all road construction and upgrading would occur even though no more than 20 of the 33 identified well pads would be constructed. It is not possible to determine which roads would be constructed and upgraded to support the 20 well pads. Depending on which 20 of the 33 well pads are constructed, road construction and upgrading would be less than that estimated for 33 well pads. The well pads selected for development would determine which existing roads would be upgraded and which new roads would be constructed. The locations of potential roads that would require upgrading and those that would be constructed to access the well pads are shown on Map 2.2-1.

The roads would be crowned, ditched, and graveled in compliance with the BLM and Forest Service *Surface Operating Standards and Guidelines for Oil and Gas Development*, also known as the *Gold Book* (BLM and Forest Service, 2007), and would meet standards set forth in BLM Road *Manual 9113* (BLM, 2011). Existing roads would be maintained in conditions equal to or better than conditions that existed prior to commencement of the Proposed Action. All equipment and vehicles would be confined to the routes shown on Map 2.2-1. Maintenance of the access roads would continue until well abandonment and final reclamation of the well pads. Road maintenance is described in detail in the Transportation Plan (Appendix A).

#### 2.2.1.1.2 Well Construction and Completion, and On-Site Accommodations

Well construction includes several activities, starting with well drilling, casing, and testing (evaluation of drill cutting, geophysical logging, and/or drill stem testing). If economic resources are identified, the wells would be completed by additional testing, to ensure casing strength, casing perforation and if necessary, well stimulation (by hydraulic fracturing).

**Well Construction**

The Humboldt, Indian Well, and Elko formations would be targeted during drilling. The target zone for the wells is between 7,000 and 14,000 feet true vertical depth. Targets for possible horizontal wells would be determined by the results of the vertical/directional wells. The length of the horizontal sections (if drilled) is not known but generally would not exceed 9,000 feet in length. Fewer wells could be drilled during exploration than are proposed, depending on well test results and geologic and market uncertainties.

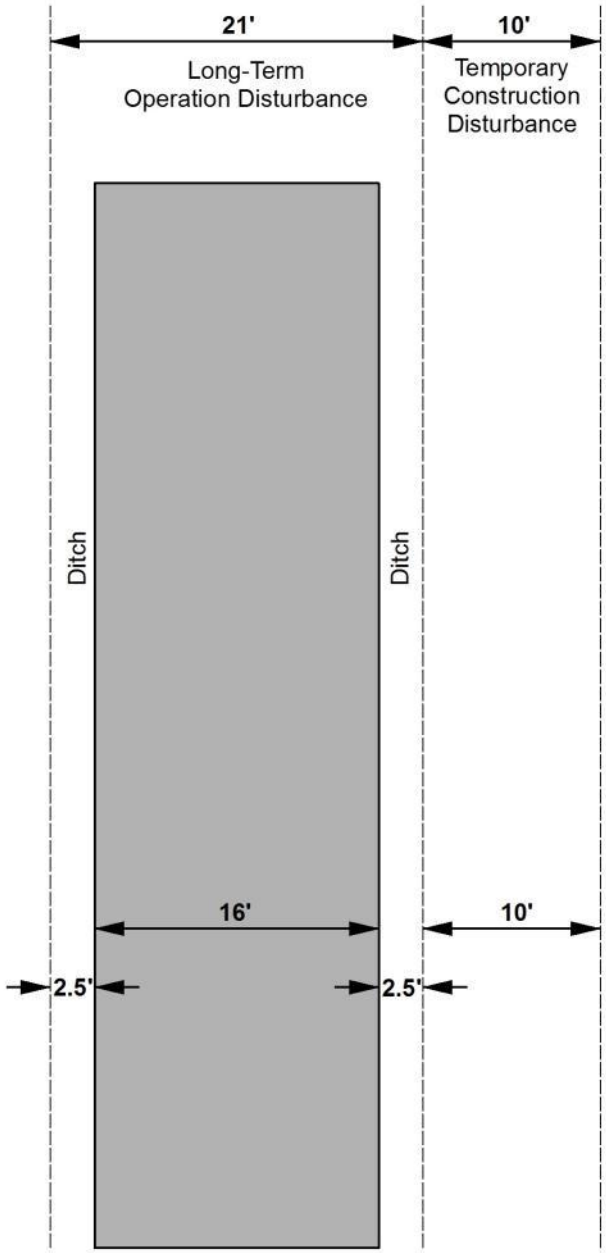


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**Figure 2.2-2**

**Resource Road**
**Disturbance Footprint**
**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014

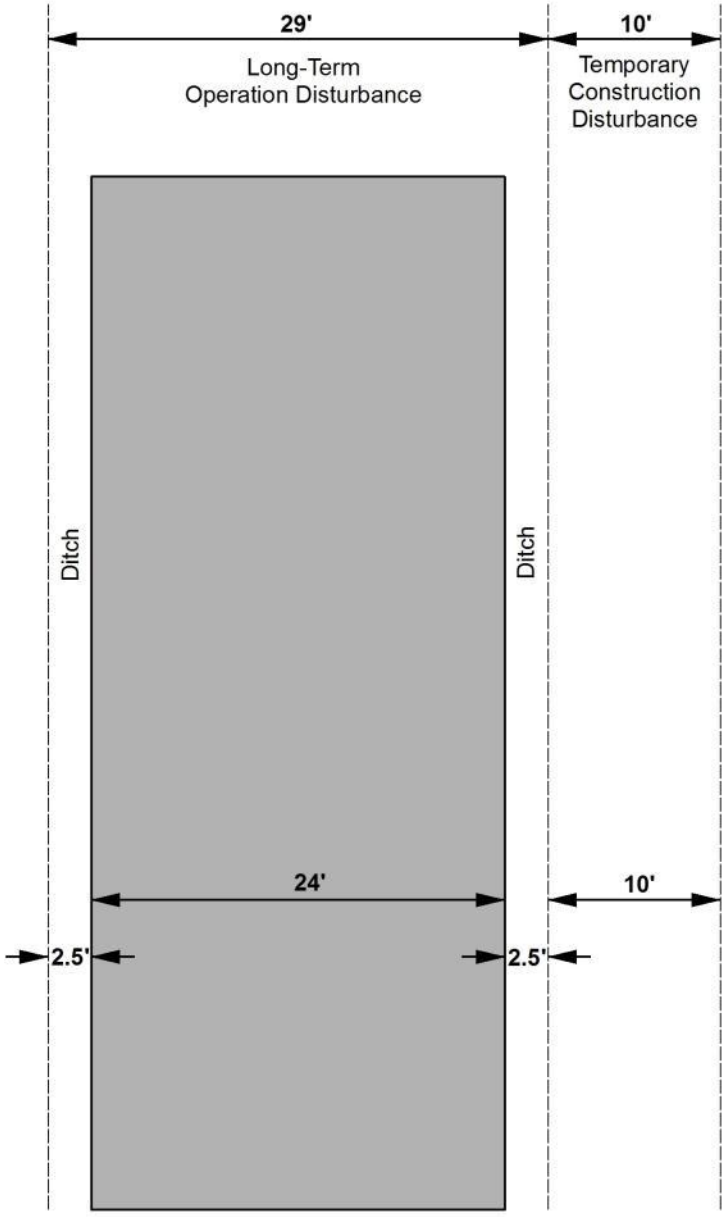


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**Figure 2.2-3**

**Local/Collector Road**
**Disturbance Footprint**
**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014

Drilling would be conducted in compliance with all Federal Onshore Oil and Gas Orders, as well as all other federal, state, and local rules and regulations. In Nevada, permitting and regulation of the oil and gas industry are also overseen by the Nevada Division of Minerals (NDOM). Noble anticipates that one drilling rig and one completion team would be required during the first year, and that two drilling rigs and one completion team could be required during the second year and beyond. Initially, one well would be drilled per pad unless Noble determines that they should be drilled in pairs for micro-seismic listening purposes during fracture stimulation.

Any usable water zones encountered during drilling would be adequately protected in accordance with the Federal Onshore Oil and Gas Orders and the 43 CFR 3100 regulations by installing surface or intermediate casing as approved by the BLM AO and reported. All usable water zones, potentially productive hydrocarbon zones, and valuable mineral zones would be isolated.

Noble would use a closed-loop drilling system which eliminates the requirement for reserve pits. Without a closed loop system, drilling fluids (mud, water, additives) are circulated through the wellbore and subsequently deposited, along with drill cuttings, in a pit dug near the well to hold used drilling fluids and cuttings. In the proposed closed-loop system, the pit is replaced with a series of storage tanks that separate liquids and solids. This equipment minimizes the amount of drilling waste muds and cuttings that require disposal and maximizes the amount of drilling fluids that are recycled and reused in the drilling process.

Drilling would be performed with circulation of an inert bentonite water-based mud, with various viscosity and density-adjusters such as polymers and barite. Density is adjusted to lift cuttings and suppress formation fluid pressure. Other additives may be used to stabilize borehole wall expansive clays. Drilling mud lubricates and cools the bit and flushes cuttings to settling tanks at the surface. Drilling mud would be displaced from the well bore in each separate casing setting and cementing event (surface, intermediate, and production casings). Cuttings would be buried on-site after testing (i.e., land farmed). It is not anticipated that soil would be imported to cover the cuttings.

Two casing strings would be installed in every borehole, and three in boreholes which are fully completed and tested. Surface casing would be set and cemented in place to a depth to isolate upper aquifers. Blowout Preventer Equipment (BOPE) would be welded to the top of the surface casing to contain unexpected fluid blowouts. The surface casing would be set in a competent bed and cemented with sufficient cement to fill the outer casing (annular) space, and set to a minimum depth of 500 feet (based on NDOM requirements) to protect freshwater aquifers. This is below the deepest permitted water well in the Project Area which is 370 feet.

The surface hole would be cased with steel casing and cemented in place entirely from ground level to the depth as determined in the individual APD. Prior to drilling below the surface casing, BOPE would be installed on the surface casing and both the BOPE and the surface casing would be tested for pressure integrity. The BOPE and related equipment would meet the minimum requirements of Federal Onshore Oil and Gas Order No. 2, and the BLM AO would be notified in advance to witness all pressure tests.

During continued drilling, intermediate casing would be set for the protection of oil, gas, usable quality water zones (if encountered), and prospectively valuable minerals deposits; for protection against abnormal pressure zones and lost circulation zones; or when otherwise required by expected well conditions (see Figures 11 and 12 in Appendix D). The casing string would be cemented with a sufficient volume of cement to cover and/or isolate all hydrocarbon

zones or other mineral deposits; to isolate abnormal pressure intervals from normal pressure intervals; and to contain any fluids with a potential to migrate and/or isolate formation fluids.

After drilling the hole to its final depth, logging tools would be run into the well to evaluate the potential hydrocarbon resource. If the evaluation indicated that adequate hydrocarbon resources were present and recoverable, steel production casing would be run and cemented into place in accordance with the well design as approved by the BLM. The entire casing and cementing program would be designed to protect and/or isolate all usable water zones, potentially productive zones, lost circulation zones, abnormally pressured zones, and any prospectively valuable deposits of minerals. BLM approval would be required prior to the use of any isolating medium other than cement.

Lighting during construction would follow "dark sky" lighting practices. Such practices are designed to reduce the effects of artificial light on the natural environment, including sky glow, glare, light trespass, light clutter, and decreased visibility at night (International Dark-Sky Association – IDA, 2014). "Dark-sky" lighting practices implemented in the Project Area would include, but not be limited to the following:

- using low glare lighting equipment;
- shielding security lighting so that the majority of light hits the target and does not cause glare;
- targeting lower lighting levels and better uniformity for safety and security lighting; and
- to the extent practical, aiming lighting on facilities from the top down, and away from adjacent areas.

**Well Completion**

After production casing has been cemented in place, the drilling rig would be removed and a completion rig would be moved in. Well completion would consist of running a cement bond log to evaluate the cement integrity and to correlate the cased hole logs to the open hole logs. The casing would then be perforated across the hydrocarbon producing zones, and the formation would be stimulated to enhance the production of oil and gas. The typical method used for stimulation consists of a hydraulic fracture treatment in which sand and fluids are pumped into the producing formation with sufficient pressure to fracture the rock formation. Hydraulic fracturing is further described in Appendix E. The sand serves as a proppant to keep the created fracture open, thereby allowing reservoir fluids to move more efficiently into the well bore. Completions are expected to take between 5 and 21 days per well. Hydraulic fracturing is part of the completion process and is expected to take between 3 and 5 days per well.

Completion fluids are custom-engineered to accomplish various objectives, including:

- Pressuring the formation through perforations in the production casing to fracture the rock, and propagate those fractures some distance into the formation;
- Carrying proppant particulates, sand, ceramic or plastic (to prop fractures open when the pressure is released), and small rubber balls to block perforations and hold injected fluids outside the casing for a short time; and
- Carrying other chemicals to "break" the gel suspending the proppant, disinfect the hydraulically fractured zone and retard microbial growth which can sour the well, and flush general residual chemicals.

Table 2.2-5 provides a tentative list of materials that may be used as completion fluid additives. Note that the list of materials does not contain diesel, which was common in fracturing fluids 10 years ago. The only constituent not fully disclosed is a proprietary amine polymer formulation ("KCl substitute") which is added in small quantities to augment clay stabilization. Most constituents are either consumed in the treatment (acid, pH buffers), inert (sand), or biodegradable. Biocide retards microbes that would otherwise grow rapidly in the guar starch, until such time as the fluid can be produced in flowback water or displaced and plugged off in a well that is abandoned.

**Table 2.2-5**
**Tentative List of Materials for Hydraulic Fracturing**

| Material | Volume | Description | Purpose | Fate |
|---|---|---|---|---|
| **Option #1: Cross-Linked Gel Sand Fracturing for Vertical Wells: 5 Stages of 150,000 lbs.** | | | | |
| Water | 425,000 gal. | Fresh Water | Fluid basis | Flowback |
| Sand | 35,000 lbs. | 100 mesh | Very fine proppant | Inert |
| Sand | 750,000 lbs. | Premium White Sand | Proppant | Inert |
| Labeled ceramic | | Radioactive tracer | Ceramic proppant with trace radioactivity | Low radioactivity |
| LGC | 5 gal/1000g | Liquid Gel Concentrate | Guar (legume) starch | Biodegradable |
| Breaker | 2.5 gal/1000g | Gel Breaker | Encapsulated ammonium persulfate oxidizer | Chemically degradable |
| HCl | 1000 gal. | 15% Hydrochloric Acid | Muriatic acid, cleaner and breaker | Neutralized by rock |
| Corrosion inhibitor | 0.5 gal/1000g | In acid solution only | Retards acid attack on steel | Adheres to steel |
| Citric Acid | 50 lbs/1000g | In acid solution only | Sequesters dissolved iron and prevents rust coat | Biodegradable |
| Ball Sealers | 1000 ea. | 5/8" diam rubber balls | After fracturing, plug perfs and hold well pressure | Inert |
| KCl | 2% in Water | Potassium Chloride | Formation clay stabilizer | Sorbed to borehole wall clay |
| "KCl Substitute" | 1 gal/1000g | Proprietary polymer | Clay stabilizer | Biodegradable, and sorbed |
| Biocide | 0.2 gal/1000g | Dibutyl normal propanamine | Disinfectant | Biodegradable |
| Cross Linker | 2.25 gal/1000g | Borate X-linker with caustic | Forms gel in guar starch | Disperses at neutral pH |
| Buffer | 0.5 gal/1000g | Formic Acid | Weak acid, pH regulator | Biodegradable |
| Non-emulsifier | 1.0 gal/1000g | | Soap | Flowback |
| Lithium bromide | 10 mg/l concentrate | Tracer | tracer | Flowback |
| **Option #2: Large Acid Job for Vertical Wells: Single Stage with Diversion** | | | | |
| Water | 13,000 gal. | Fresh Water | Fluid basis | Flowback |
| HCl | 100,000 gal. | 15% Hydrochloric Acid | Muriatic acid, cleaner and breaker | Neutralized by rock |
| Ball Sealers | 1000 ea. | 5/8" diam. RCN Ball Sealers | After fracturing, plug perfs and hold well pressure | Inert |
| Citric Acid | 50 lbs/1000g | Iron Sequestrant | Sequesters dissolved iron and prevents rust coat | Biodegradable |
| Surfactant | 2 gal/1000g | Friction Reducer | | |
| Demulsifier | 1.0 gal/1000g | | | |
| Biocide | 0.2 gal/1000g | Dibutyl normal propanamine | Disinfectant | Biodegradable |
| Corrosion inhibitor | 0.5 gal/1000g | In acid solution only | Retards acid attack on steel | Adheres to steel |
| KCl | 2% in Water | Potassium Chloride | Formation clay stabilizer | Sorbed to barehole wall clay |
| **Option #3*: Cross-Linked Gel Sand Fracturing for Directional wells: 10 Stages of 150,000 lbs.**<br>(Double all volumes of Option #1)<br>(Large Acid Job Option not recommended for Directional Wells)<br>*May be used later in exploration. | | | | |

Lithium bromide would be added to injected water as a tracer and may be used to affirm casing integrity and locate fracture paths. It exists in solution as ions which are not readily adsorbed to solids or reacting with outer solutes, and would migrate at the same rate as the carrying fluid. Lithium bromide is included in the sampling parameter list in the Aqua Program (see Appendix F) because it can function as an identifying signature in the event the fluid is suspected to have reached a well or spring.

The radioactive tracer, if used, would be a low-level radioactive additive which requires operator training but no special handling measures, and can be detected outside the casing by sensitive logging tools. These substances are either recovered in flowback water which is disposed of, or may remain sealed in the subsurface if the well is plugged. Some radioactive tracer is inserted in ceramic proppant so that it can indicate fracture strength, and some may be alloyed into casing collars to identify them in logs. All radioactive tracer material use is strictly regulated by the Nuclear Regulatory Commission (NRC) and the U.S. Environmental Protection Agency (EPA), in terms of storage, handling, and disposal.

Subsequent to drilling and completion, the well would be shut in under pressure, and that pressure would be monitored to assess formation pressures and the possibility of leaks, prior to final development.

**On-Site Accommodations**

Noble would provide on-site accommodations for drilling workers. On-site accommodations at the pad location would consist of self-contained mobile modular buildings that require no foundation or construction, and would include six units for well site support services and six units providing temporary housing quarters for up to 30 workers (see Appendix D). The on-site accommodations would require no water withdrawal from or discharge into the Project Area. Noble would obtain a permit from the NDEP Bureau of Safe Drinking Water to operate a public water system, to include five booster pump stations, three 3,135 gallon storage tanks, and a distribution system, for the on-site accommodations. Noble would also obtain a permit from the NDEP Bureau of Water Pollution Control to install three 4,000 gallon domestic wastewater holding tanks. The water systems would provide water for showers, laundry, inside toilets, laboratories, and cooking. Noble would contract with an approved water hauler in the State of Nevada to haul potable water to the storage tanks on the well pad and haul wastewater from the pad locations to an approved disposal facility. Drinking water would be brought to the site in 5 gallon containers.

The modular buildings would be located directly on the well pad where a well was being drilled and would be removed once drilling was completed (after an estimated 50 to 65 day drilling period). Each drill crew would occupy the on-site accommodations for approximately 14 days and drilling workers would not be allowed to leave the Project Area. On-site accommodations would not be provided for completion workers.

Noble anticipates that one drill rig would be required during the first year and that two rigs would be used in the second year. Accordingly, on-site housing occupancy would peak in the second year, with 60 drilling workers staying in modular units placed on two pad locations. Peak traffic estimates would include up to 60 additional light vehicles per day if on-site housing was not used. Noble would obtain all appropriate permits from the BLM and the State of Nevada for on-site accommodations.

#### 2.2.1.1.3 Water Requirements and Water Supply

During the Construction/Drilling Phase, water would be required for drilling, well completion, dust control, and temporary on-site accommodations. Water volumes required for drilling a vertical/directional well would depend on the depth of the well. Anticipated water use for drilling a vertical/directional well is approximately 10,000 barrels (420,000 gallons). The volume of water required to drill a horizontal well, approximately 30,000 barrels (1.26 million) gallons, would depend on the depth of the vertical portion of the well and the length of the horizontal section. If 16 of the 20 proposed wells are vertical/directional wells and four are horizontal wells, total water required for drilling could be up to 280,000 barrels (11.76 million gallons or 36.1 acre-feet).

Well completion (flushing and hydraulic fracturing), which establishes the flow path between the reservoir and the surface, is expected to require 20,000 barrels (840,000 gallons) for a single vertical/directional well and 200,000 barrels (8.4 million gallons) for a single horizontal well. Based on knowledge gained during the first year of construction, Noble anticipates decreasing the water required to complete a vertical/direction well to 13,000 barrels (546,000 gallons) with a goal of 6,000 barrels (252,000 gallons) per well. If 16 of the 20 proposed wells are vertical/directional wells and four are horizontal wells, total water required for completion could include up to 1,120,000 barrels (47.04 million gallons or 144.4 acre-feet). Table 2.2-6 summarizes the estimated water requirements for drilling and completion of a single well.

**Table 2.2-6**
**Estimated Water Required to Drill and Complete a Single Well**

| | Drilling | | Completion | |
|---|---|---|---|---|
| **Well Type** | **Barrels** | **Gallons** | **Barrels** | **Gallons** |
| Vertical/Directional Well | 10,000 | 420,000 | 20,000 | 840,000 |
| Horizontal Well | 30,000 | 1,260,000 | 200,000 | 8,400,000 |

Dust control (construction and traffic) during the Construction/Drilling Phase would require an estimated 973 barrels (40,866 gallons) of water per day in the first year of exploration, and 3,891 barrels (163,422 gallons) of water per day in the second year. Areas proposed for disturbance would be pre-watered, disturbed areas and dirt roads would be watered on a regular basis, and water sprays would be applied to material storage piles on a regular basis. The volume of water required for dust control would depend on climatic conditions and would be lower if Noble used other methods to control dust, such as:

- Graveling of roadways, storage areas, and staging areas;
- Following posted speed limits and not exceeding 20 miles per hour (mph) where not posted;
- Halting construction when high winds inhibit dust control;
- Using other dust suppressants such as DirtGlue, magnesium chloride, and tree sap; and/or
- Re-vegetating reclaimed areas.

Temporary on-site accommodations for drilling workers would require approximately 36 barrels (1,512 gallons) of water per day per drilling location (Noble, 2014). Noble proposes to use one drill rig during the first year of construction and two drill rigs during the second year. Therefore, water use at on-site accommodations would approximate 36 barrels (1,512 gallons) per day during the first year and 72 barrels (3,024 gallons) per day during the second year.

Table 2.2-7 summaries the Proposed Action's estimated water requirements during the anticipated two years of Project construction. Approximately 243,879 barrels (10.2 million gallons) are expected to be required during the first year of construction, and approximately 1,773,015 barrels (74.5 million gallons) are expected to be required during the second year.

**Table 2.2-7**
**Estimated Annual Water Requirements during Construction**

| Year and Project Activity | Water Required | |
|---|---|---|
| | **Barrels** | **Gallons** |
| **Year 1** | | |
| Drilling[1] | 40,000 | 1,680,000 |
| Completions[1] | 80,000 | 3,360,000 |
| Dust Control[2] | 116,736 | 4,902,912 |
| On-Site Worker Housing[3] | 7,143 | 300,006 |
| **Total Water Use – Year 1** | **243,879** | **10,242,018** |
| **Year 2** | | |
| Drilling[4] | 240,000 | 10,080,000 |
| Completions[4] | 1,040,000 | 43,680,000 |
| Dust Control[5] | 466,944 | 19,611,648 |
| On-Site Worker Housing[6] | 26,071 | 1,094,982 |
| **Total Water Use – Year 2** | **1,773,015** | **74,466,630** |

[1] Based on four vertical/directional wells drilled and completed in Year 1.
[2] Based on 80 barrels of water per mile applied to 12 miles of unpaved roads (miles associated with construction of 4 pads) for 120 days.
[3] Based on 35.7 barrels of water per day consumed at one drilling location for 200 days.
[4] Based on 16 vertical/directional wells and four horizontal wells drilled and completed in Year 2.
[5] Based on 80 barrels of water per mile applied to 49 miles of unpaved roads (miles associated with construction of 16 pads) for 120 days.
[6] Based on 71.4 barrels of water per day consumed at two drilling locations for 365 days.

Water wells would be drilled on individual well pads to provide water for drilling, completions, and dust suppression during the Construction/Drilling Phase. Water well depth would depend on the findings of the water well driller and well testing to assess safe yield. Noble expects that on-site water wells would provide approximately 70 percent of the water required for drilling, completions, and dust control. On-site water wells from one pad could be used to supply water for drilling, completion, and dust control on subsequent pads within close proximity. Water supply wells on private land may be used by the landowner during Noble's activities and turned over to the landowner for agricultural use once Noble's activities conclude. All water uses would be permitted through the Nevada Division of Water Resources (NDWR).

Water wells may be drilled on pad locations along collector roads instead of on the production well pad. This would allow for water to be available while building long lengths of roads to pad locations and to construct the original well pad. Water may be transferred from the water well pad to the production well pad via a flexible fiber line similar to a fire hose. The line would run from the water well along the road ditch up to the drilling rig water storage tank. Water well pads would have a water well and a storage tank and would require about 1 acre of disturbance. The well pad would be expanded if it was later selected for a production well pad. In either case, the water well pad would count as one of the 20 well pads to be constructed. Overall, Noble expects that on-site water wells would provide 165,715 barrels (7 million gallons) of water during the first year of construction and 1,222,861 barrels (51.4 million gallons) of water during the second year.

Noble would permit ground water wells in accordance with applicable federal and state law for industrial use. Subsequent to use for industrial purposes, the landowner may seek to use the well for stock watering or other lawful agricultural beneficial use(s).

Noble expects that off-site water sources would provide approximately 30 percent of the water needed for drilling, completion, and dust control, and all of the water required by on-site accommodations. Off-site water would be supplied by a water utility (City of Elko and/or City of Wells – both of which have declared their ability and willingness to sell the water). Overall, Noble expects that off-site water sources would provide 78,164 barrels (3.3 million gallons) during the first year of construction and 550,155 barrels (23.1 million gallons) during the second year. Water would be transported from water utilities by tanker truck over existing roads. Traffic associated with water supply and delivery is described in the Transportation Plan (Appendix A).

#### 2.2.1.1.4 Workforce

Table 2.2-8 shows peak construction workforce estimates for the Proposed Action. The construction workforce would peak at 130 workers during the second year and would occur with two drilling rigs and one completion rig operating simultaneously. During the first year, when one drilling rig and one completion rig would be in operation, the construction workforce would include approximately 95 workers. Drilling rigs would operate 24 hours per day, 7 days per week, and well completion crews would work during daylight hours, 7 days per week.

**Table 2.2-8**
**Estimated Peak Construction Workforce, Year 2**

| Construction Workforce Category | Peak Number of Workers |
|---|---|
| Well Pad and Road Construction | 7 |
| Water Well | 4 |
| Drilling[1] | 60 |
| Completion[2] | 50 |
| Water Truck Drivers[3] | 6 |
| Dust Control[4] | 1 |
| Interim Reclamation | 2 |
| **Total Peak Construction Workforce** | **130** |

[1] Based on two drilling rigs in operation with two eight-man drilling crews per rig. Drilling crews would work alternate 12 hour shifts. Additional drilling personnel include site managers, well site consultants, mudloggers, mud engineers, solids control, directional driller, measurement while drilling (MWD), and active system aeration.
[2] Based on one completion rig in operation and 50 workers during hydraulic fracturing.
[3] Based on 30 percent of the water used for drilling and completion, and all of the water used in the on-site accommodations being delivered in 120 barrel (5,040 gallon) trucks. Assumes that 1.5 hours are required to complete a round-trip for trucks hauling water to the Project Area.
[4] Based on 80 barrels (3,360 gallons) of water per mile sprayed from 100 barrel (4,200 gallon) capacity trucks.

Noble expects that drilling and well completion crews would consist of non-local workers, and that other construction workers would be likely to reside in the local area. Noble expects that approximately 10 percent of the construction workforce (26 workers) would be local and approximately 90 percent (104 workers) would be non-local.

#### 2.2.1.1.5 Traffic

Noble intends to use one drill rig in the first year of Project construction. Because on-site water wells would provide approximately 70 percent of the water required for drilling, and all drilling workers would be housed on the well pad in on-site accommodations and would remain on-site while the well is being drilled, traffic associated with drilling a single well would include approximately six vehicles per day. During the first year of the Construction/Drilling Phase, typical Project-related traffic levels would occur with one vertical/directional (production) well being drilled, one vertical/directional (production) well being completed, deliveries, and dust control. At these times, Project traffic would potentially include 26 light vehicle and 20 heavy vehicle round-trips, for a total of 46 round-trips per day. Noble proposes to use two drill rigs during the second and any subsequent years of construction. With two drill rigs, typical traffic levels in the Project Area would include 30 light vehicle round trips and 21 heavy vehicle round-trips, for a total of 51 round-trips per day (see Table 2.2-9).

There could be up to 30 additional light vehicle round-trips on the days on which drilling crews change (every 14 days). Additional traffic would also occur during periods of rig mobilization, which would include moving the modular structures sited on the well pad. Rig mobilization is expected to include 5 days for rig set-up and 5 days for rig take-down. During these 10 days, additional traffic in the Project Area would include nine light vehicles and 15 heavy vehicles.

**Table 2.2-9**
**Estimated Typical Construction/Drilling Traffic in**
**Vehicle Round-Trips per Day, Years 1 and 2**

| Construction Activity | Peak Vehicle Round-Trips per Day | | |
|---|---|---|---|
| | Light Vehicle | Heavy Vehicle | Total Vehicles |
| Drilling (one well) | 4[1] | 2[2] | 6 |
| Completion | 12[3] | 17[4] | 29 |
| Service and Deliveries | 10[5] | 0 | 10 |
| Dust Control | 0 | 1[6] | 1 |
| **Total Typical Construction Traffic – Year 1[7,8]** | **26** | **20** | **46** |
| **Total Typical Construction Traffic – Year 2[7,9]** | **30** | **21** | **51** |

[1] Based on all drilling workers housed in on-site accommodations and remaining on-site for 14 days. Light vehicles include four miscellaneous personal vehicles per drill pad.
[2] Based on 30 percent of the water required to drill a vertical/directional well (3,000 barrels or 126,000 gallons) and all of the water used by on-site accommodations being delivered in 120 barrel capacity trucks. Includes one additional truck per day delivering supplies (e.g. casing deliveries, cement trucks, wireline logging trucks) to each drill pad.
[3] Based on completion workers carpooling in ten vehicles, and includes two supervisor vehicles.
[4] Based on 30 percent of the water required to complete a vertical/directional well (6,000 barrels or 252,000 gallons) being delivered in 120 barrel capacity trucks. Includes 15 trucks delivering equipment and materials for well completion.
[5] Includes equipment and supply deliveries and service visits.
[6] Based on one 100 barrel capacity truck applying 80 barrels (or 3,360 gallons) of water per mile per day to unpaved access roads.
[7] Because access road and pad construction, drilling the water well, drilling the production well, and interim reclamation occur sequentially at each site location, typical traffic levels include drilling, completion, service/delivery, and dust control traffic only.
[8] Based on one vertical/directional well being drilled and one vertical/directional well being completed.
[9] Based on two vertical/directional wells being drilled and one vertical/directional well being completed.

Depending on the test results of wells drilled during this first year, Noble may drill up to four horizontal wells during following years. If horizontal wells are drilled and completed, peak traffic could occur with one well pad under construction, two drill rigs and one completion team (completing a horizontal well) in operation, supplies being delivered, and dust suppression and interim reclamation being conducted. Under these conditions, peak traffic could potentially include 35 light vehicle round trips and 48 heavy vehicle round trips, for a total of 83 vehicle round-trips per day (see Table 2.2-10). This peak traffic would only occur when completion of a horizontal well coincided with the simultaneous drilling of two wells.

Estimated peak traffic levels are based on several assumptions; the foremost being that horizontal wells are developed and that the maximum number of vehicles associated with each construction activity would travel on the same day. Typical traffic levels during construction are likely to be lower than the peak traffic estimates shown in Table 2.2-10, depending on the number of construction activities taking place and the extent of each activity being conducted.

**Table 2.2-10**
**Estimated Peak Construction/Drilling**
**Traffic in Vehicle Round Trips per Day, Year 2**

| Construction Activity | Peak Vehicle Round-Trips per Day | | |
|---|---|---|---|
| | Light Vehicle | Heavy Vehicle | Total Vehicles |
| Road and Pad Construction | 5[1] | 4[2] | 9 |
| Drilling [3] | | | |
| One vertical well | 4 | 2 | 6 |
| One horizontal well | 4 | 2 | 6 |
| Completion | | | |
| One horizontal well | 12[3] | 39[4] | 51 |
| Service and Deliveries[3] | 10 | 0 | 10 |
| Dust Control[3] | 0 | 1 | 1 |
| Interim Reclamation | 0 | 1 | 1 |
| **Total Peak Construction Traffic** | **35** | **48** | **83** |

[1] Based on carpooling, with four personal vehicles for seven workers, and one supervisor light vehicle.
[2] Includes four trucks hauling gravel. Heavy equipment for road and pad construction would remain on-site.
[3] See notes for Table 2.2-9.
[4] Based on 30 percent of the water required to complete a horizontal well (60,000 barrels or 2,520,000 gallons) being hauled in 120 barrel trucks over a 5 to 21 day completion period. An additional 15 trucks would deliver equipment and materials for well completion.

### 2.2.1.2 Production/Operations Phase

Once wells are drilled and completed, if economically viable, they would be placed into production and operated for up to 20 years. The results of the Proposed Action would help Noble determine whether economic quantities of oil can be produced in the Marys River Area.

After all wells have been drilled on the well pad, a working area of up to 5.0 acres per well pad (3.5 acres on average) would remain disturbed throughout the Production/Operations Phase (Figure 2.2-4). This long-term disturbance would remain until the well is abandoned and the site undergoes final reclamation. Permanent stormwater controls and BMPs would be installed on the production well pad. Total long-term surface disturbance for 20 well pads is estimated at 100.0 acres but could be as low as 70.0 acres depending on the well pad size after interim reclamation. Long-term disturbance refers to bare ground and does not include reclaimed areas.

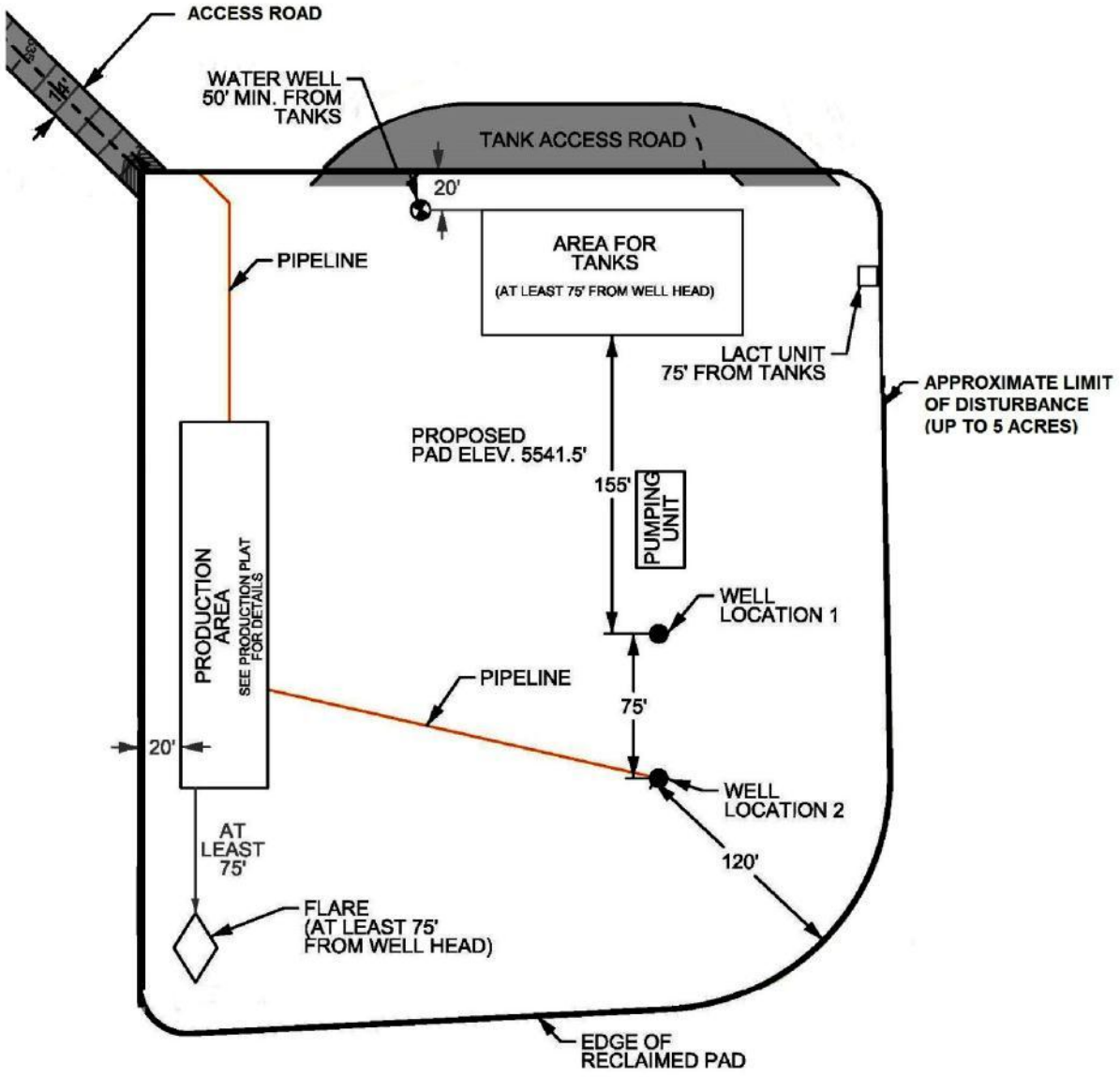


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**Figure 2.2-4**

**Typical Production Location**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014

After the Construction/Drilling Phase, production equipment would be installed on the production well pad. Equipment and facilities located on the production well pad would include the wellhead, pumping unit, vertical treater, re-circulating pump, one gas flare, two-phase separator building, line heater, generator, four 400-bbl oil tanks, two 400-bbl water tanks and one fuel tank. Typical drawings of exploration well pads showing the location of production facilities are shown in Appendix D. If two wells are located on a single well pad, production equipment would be shared to the greatest extent possible. No off-pad ancillary facilities are planned during the Production/Operations Phase.

Oil and water ("produced water") would be pumped from the wellhead, separated, and stored in tanks on-site. Noble anticipates that 12 wells could produce up to 250 barrels (10,500 gallons) of oil per day and that eight wells could produce up to 100 barrels (4,200 gallons) of oil per day. A small amount of natural gas may be produced with the oil which would be used to run the production equipment. Excess natural gas would be flared in accordance with NTL-4A (Royalty or Compensation for Oil and Gas Lost). NTL-4A allows for initial well evaluation tests, not exceeding a period of 30 days or the production of 50 million cubic feet of gas, whichever occurs first, unless a longer test period has been authorized by the appropriate State regulatory agency and ratified or accepted by the BLM. Hydrogen Sulfide ($H_2S$) is not expected to be present or released. Noble drilled two wells on private land in Elko County and no detectable $H_2S$ down to 30 ppm (limit of mass spectrometer analysis of mud gas) was found in either well. Based on a review of well histories and logs (Tuano Draw well and the Jiggs federal wells) in Elko County, there is no indication of $H_2S$. Gas chromatograph results of drilling mud from the isotube detected no $H_2S$. Any natural gas produced will be tested for $H_2S$ content.

All installed production facilities with the potential to leak or spill oil, condensate, produced water, glycol, or other fluid which might be a hazard to public health or safety would be placed within an appropriate impervious secondary containment structure that would hold 110 percent of the capacity of the largest single container within it for 72 hours. Secondary containment would consist of corrugated steel containment berms or earthen berms. Compaction and construction of earthen berms would be performed to prevent lateral movement of fluids through the utilized materials. All loading lines would be placed inside the containment berm.

All facilities or structures would be painted a natural color (or BLM Standard Environmental Color if specified by the BLM) in a non-reflective finish that blends with the background landscape. In cases of split estate associated with federal minerals, the surface equipment would be painted in accordance with BLM requirements unless the private surface owner requests differently. Permanent lighting during operations would be manually operated by operations personnel on location and would include lighting for the valve building, treater house, and load rack area. "Dark-sky" lighting practices used during the Production/Operations Phase would include low glare lighting equipment, and hooded and shielded lighting fixtures that face downward and away from adjacent areas (IDA, 2014).

#### 2.2.1.2.1 Water Requirements and Water Supply

During the Production/Operations Phase, water may be required for dust control which would be implemented on an as-needed basis. The volume of water required for dust control would depend on annual climatic conditions, but could include up to 583,680 barrels (24.5 million gallons) per year during operations. This estimate of potential maximum water use is based on the expectation that 80 barrels of water per mile per day would be applied to approximately 61 miles of unpaved roads for 120 days. On-site water wells are expected to provide 70 percent of the annual water requirements for dust control (408,576 barrels or 17.2 million gallons) and off-site water sources are expected to provide 30 percent (175,104 barrels or 7.4 million gallons).

Other methods of dust control could also be used, if approved by the BLM. Dust abatement would primarily be required if roads were not graveled. Constructing roads to Gold Book Standards may reduce water consumption for dust control.

#### 2.2.1.2.2 Oil Production

Oil produced at the wellhead would be stored in on-site tanks located on the production well pad. Oil would be picked up in 200 barrel (8,400 gallon) tanker trucks and hauled to refineries in Salt Lake City, Utah and California.

#### 2.2.1.2.3 Water Disposal

The amount of water recovered (including flowback of water injected during well completion and formation water condensate (produced water) in the production stream) is not readily predictable in any one well, but may be estimated for a field of many wells. Produced water is estimated to be approximately 100 barrels (4,200 gallons) per well per day for the 12 wells producing 250 barrels (10,500 gallons) of oil per day and approximately 40 barrels (1,680 gallons) per well per day for the eight wells producing 100 barrels (4,200 gallons) of oil per day. With 20 producing wells, there could be as much as 1,520 barrels (63,840 gallons) of produced water per day. Produced water would be stored in steel tanks on the production well location.

Flowback and produced water may consist of completion fluids and formation fluids, and contain additives and hydrocarbons and brine present in existing pores, all of which render the water unfit for most uses except potential recycle in drilling fluids. Radioactive tracers, if used, could be a minor constituent, added to by an even smaller amount of naturally occurring radioactive elements such as radium and 40K potassium (NORM). All of these constituents render flowback and produced water hazardous by definition and if it is not recycled it must be disposed of as hazardous waste. Drilling, completion, flowback and produced waters would be fully contained at all times and disposed of in an approved manner.

One option for produced water disposal would be to truck produced water to an approved disposal facility (Clean Harbors) between Wendover, Nevada and Salt Lake City, Utah. Another disposal option would be for Noble to convert an exploration well on one of the 20 selected well pads to a disposal/injection well and to dispose produced water in this well. The disposal/injection well would be permitted through the Nevada State Engineer's Office and NDEP as an Underground Injection Control (UIC) Class II well. Produced water, drilling fluids, and all waste associated with exploration and production of crude oil, natural gas, and geothermal energy are regulated by the federal UIC program, administered in Nevada by NDEP. Class II UIC facilities are exempted from the Resource Conservation and Recovery Act (RCRA) requirements and therefore, the standard RCRA evaluation is not required. The construction of each and every exploration well would meet specifications for a disposal/injection well, including proven isolation of the injection zone from all drinking use aquifers. NDEP regulation is more restrictive than federal UIC rules on aquifer exemption, which is commonly claimed on the basis of brine aquifers being not water resources. NDEP holds that all water is potentially treatable and usable and therefore Nevada UIC permitting requires that the injection target be characterized as not an aquifer capable of economically yielding usable water.

#### 2.2.1.2.4 Workforce

Table 2.2-11 shows the peak workforce during the Production/Operations Phase. Once all wells are producing, the workforce would peak at 35 workers. The workforce could be reduced by 10 truck drivers if Noble drills and operates a produced water disposal/injection well within the

Project Area. The number of truck drivers would also be affected by the amount of oil produced per well.

Noble expects that the pumper, maintenance worker, and produced water and dust control truck drivers would come from the local area. Oil truck drivers are expected to be non-local workers employed by crude oil transportation companies headquartered outside Elko County. With off-site produced water disposal, Noble expects that approximately 45 percent of the operations workforce (16 workers) would be local and that 55 percent (19 workers) would be non-local. If produced water is disposed in an on-site disposal/injection well, Noble expects that approximately 25 percent of the operations workforce (6 workers) would be local and that approximately 75 percent (19 workers) would be non-local.

**Table 2.2-11**
**Estimated Peak Production/Operations Workforce**

| Operational Workforce Category | Peak Number of Workers |
|---|---|
| Pumper | 1 |
| Maintenance Worker | 1 |
| Oil Truck Drivers[1] | 19 |
| Produced Water Truck Drivers[2] | 13 |
| Dust Control[3] | 1 |
| **Total Peak Production/Operations Workforce** | **35** |

[1] Based on oil production of 250 barrels (10,500 gallons) per day from 12 wells and 100 barrels (4,200 gallons) per day from eight wells transported in 200 barrel (8,400 gallon) capacity trucks.

[2] Based on 100 barrels (4,200 gallons) of produced water per day from wells producing 250 barrels (10,500 gallons) of oil per day and 40 barrels (1,680 gallons) of produced water per day from wells producing 100 barrels (4,200 gallons) of oil per day transported by truck (120 barrel capacity) to Clean Harbors. As few as three drivers could be required if produced water is disposed in an on-site disposal/injection well.

[3] Based on 80 barrels (3,360 gallons) of water per mile sprayed from 100 barrel (4,200 gallon) capacity trucks on an as-needed basis.

#### 2.2.1.2.5 Traffic

During the Production/Operations Phase, Project-related traffic would occur 5 days per week. Peak traffic is shown in Table 2.2-12 and would include one pumper truck visiting each production well pad approximately once per day, one maintenance vehicle visiting each well pad approximately 10 days per year, and one water truck applying water to unpaved roads on an as-needed basis. With total estimated oil production of 3,800 barrels (159,600 gallons) per day, 19 oil truck trips per day would be required to haul oil to refineries in Salt Lake City, Utah and California.

Thirteen water truck trips would be required per day to haul 1,520 barrels (63,840 gallons) of produced water to off-site disposal facilities (Clean Harbors between Wendover, Nevada and Salt Lake City, Utah). With up to 20 wells in production, peak traffic during the Production/Operations Phase could include 35 vehicle round-trips per day. Water truck traffic would be contained within the Project Area if produced water is disposed in an on-site disposal/injection well. With on-site produced water disposal, peak production traffic would include 22 round-trips per day. Actual traffic levels during the Production/Operations Phase would be highly dependent on the amount of oil and water produced per well, and would decrease over the life of the Project due to declining well productivity.

**Table 2.2-12**
**Estimated Peak Production/Operations Traffic in Vehicle Round Trips per Day**

| Operational Activity | Peak Vehicle Round-Trips per Day | | |
|---|---|---|---|
| | Light Vehicles | Heavy Vehicles | Total Vehicles |
| Pumper[1] | 1 | 0 | 1 |
| Maintenance[2] | 1 | 0 | 1 |
| Oil Trucks[3] | 0 | 19 | 19 |
| Produced Water Trucks[4] | 0 | 13 | 13 |
| Dust Control[5] | 0 | 1 | 1 |
| **Total Production Vehicles** | **2** | **33** | **35** |

[1] Based on one pumper visit per day per well.
[2] Based on one maintenance truck serving all wells.
[3] Based on oil production of 250 barrels (10,500 gallons) per day from 12 wells and 100 barrels (4,200 gallons) per day from 8 wells transported in 200 barrel (8,400 gallon) trucks.
[4] Based on 100 barrels (4,200 gallons) of produced water per day from wells producing 250 barrels (10,500 gallons) of oil per day and 40 barrels (1,680 gallons) of produced water per day from wells producing 100 barrels (4,200 gallons) of oil per day transported in 120 barrel trucks. This traffic would be contained within the Project Area if produced water is disposed in an on-site disposal/injection well.
[5] Based on dust suppression on unpaved road surfaces occurring on an as-needed basis.

### 2.2.1.3 Abandonment and Reclamation

#### 2.2.1.3.1 Well Plugging and Abandonment

Dry/non-producing wells would be plugged, abandoned, and reclaimed within 90 days of well completion, weather permitting. Upon abandonment, each borehole would be plugged, capped, and its related surface equipment removed, and a Sundry Notice (written request for approval to perform work not covered by another type of permit) would be submitted to the BLM. This notice would describe the engineering, technical, and/or environmental aspects of final plugging and abandonment, as well as final reclamation procedures and any mitigation measures associated with final reclamation. The BLM and NDOM standards for plugging and abandonment would be followed. A configuration diagram, a summary of plugging procedures, and a job summary with techniques used to plug the wellbore (e.g., cementation) would be included in the Sundry Notice.

#### 2.2.1.3.2 Interim Reclamation

Interim reclamation would occur according to measures described in the Marys River Reclamation Plan (Appendix G). After drilling and completion, interim reclamation would occur when the well is put into production. Noble anticipates that production well pads would be reduced to approximately 3.5 acres (on average) to accommodate production of the well and the production facilities. Interim reclamation would include:

- Disturbed surfaces to be reclaimed would be prepped and seeded, for stability and to maintain soil viability;
- Slopes would be seeded and matted with appropriate reclamation materials to prevent erosion;
- Weeds would be monitored in accordance with the Marys River Integrated Weed Management Plan (Appendix H); and
- Access roads would be maintained.

Noble would implement a baseline ecosite vegetation and weed survey for each well pad prior to construction to ensure that a BLM-approved seed mix design would be applied to ecosites already existing at the location, and to ensure protections from erosion due to cattle grazing during interim reclamation (fencing would be determined on a case-by-case basis).

#### 2.2.1.3.3 Final Reclamation

A well pad that no longer has a producing well would undergo final reclamation. Prior to final reclamation, Noble would meet with the BLM to inspect the disturbed area, review the existing reclamation plan, and agree to any changes to the plan.

Prior to re-contouring and seeding, the following would occur:

- All equipment, facilities, and trash would be removed from the location;
- Each borehole would be plugged, capped, and its related surface equipment removed; and
- Dry hole markers would be subsurface, to prevent their use as perching sites by raptors.

#### 2.2.1.3.4 Water Requirements

Water required during abandonment would be minimal and may include water to mix cement for well plugging. Water would not be used for reclamation.

### 2.2.1.4 Schedule

Noble would begin construction once all permits and approvals are obtained. Up to four well pads (with up to four wells) would be constructed during the first year and the remainder of the well pads would be constructed during the second year and beyond. Depending on the results of well tests, up to four of the wells drilled after the first year could be horizontal wells. Drilling a vertical/directional well would require approximately 50 days and drilling a horizontal well would require approximately 65 days. Well completions are expected to require between 5 and 21 days (3 to 5 days for hydraulic fracturing). Well pad and road construction would require approximately 5 days per well pad; drilling a water well would require between 7 and 10 days; and interim reclamation would require approximately 3 days per well pad. Producing wells are expected to be in operation for approximately 20 years.

### 2.2.1.5 Site Specific Resource Surveys

**Land Survey.** Well pad locations have been staked in the field. A survey of the proposed access roads and well pad locations would be completed by a registered professional land surveyor, and construction plats would be submitted with APDs prior to construction. A preliminary center stake survey with access roads has been completed by a professional land surveyor for well pads on federal lands and on private lands with federal minerals.

**Cultural Survey.** A cultural resource inventory of the proposed well pads and their access routes was conducted by Cultural Resource Analysts, Inc. (CRA) in 2012 in accordance with applicable state and federal requirements (Hoffert et al., 2012a). The inventory of the proposed well pads and access roads encompassed 2,596 acres of land including BLM-administered land and private lands where permission was obtained. Thirty-five potential well pad locations were identified from 40 original areas that were surveyed for cultural resources. A standard 20 acres was pre-planned for survey at each potential location with 7 acres intended for initial development. The standard survey area was revised or relocated when adjustments to potential pad locations were made to avoid sensitive cultural and biological properties or to lessen the surficial landscape impacts. A total of 61 miles of access roads required cultural resource inventory to provide access to the well pads selected for the proposed exploration. A minimum

200 foot corridor was surveyed for road improvements or for the construction of new roads to access the exploration pads.

**Biological Surveys.** Biological surveys were used to establish current conditions and utilization of the area by wildlife. Information gained from the surveys was utilized to adjust the Proposed Action; thus, avoiding and minimizing effects to wildlife. Surveys conducted are listed below:

Hayden-Wing Associates, LLC (HWA) completed BLM-approved block surveys for wildlife and vegetation throughout the entire Project Area from March 1 to April 15, 2012 (HWA, 2012). The Wildlife Monitoring Report for Exploration Activity in the Mary's River Project Area was submitted to the BLM for review and comment on November 1, 2012 (HWA, 2012).

Greater sage-grouse winter concentration surveys were conducted during February 2013 (HWA, 2013a). Greater sage-grouse lek attendance surveys were also conducted in 2013 (HWA, 2013b).

JBR Environmental Consultants, Inc. (JBR) collected baseline data for bat species within the Project Area in August 2013 (JBR, 2013a) for the purpose of incorporation into Noble's Bird and Bat Conservation Strategy (BBCS). The survey area for the baseline acoustic bat survey included approximately 39,444 acres of BLM-administered and private lands in the Marys River Project Area.

**Noise Surveys.** Noise surveys were utilized to establish current conditions and develop models to predict how noise travels across the Project Area. The results of the noise survey are utilized in the cultural and special status species sections. HWA (2013c) conducted background sound level measurements for 7 days between April and mid-May, 2013 at each of three greater sage-grouse leks in the Project Area to collect a full spectrum of natural and human-caused noise (see Appendix I).

J.C. Brennan & Associates, Inc. (Brennan) conducted noise measurements in the Lamoille Valley in September 2013 for the drilling rig to be used in the Marys River Project Area (Brennan, 2013a). The noise measurements were used to develop noise contours indicating potential noise levels at each proposed well pad and extension of the noise contour at greater sage-grouse leks in the Marys River Project Area (Brennan, 2013b). An additional analysis was conducted to determine the effects of snow on sound propagation.

**Visual and Auditory.** Western Cultural Resource Management, Inc. (WCRM) completed a visual and auditory assessment of the California National Historic Trail (CNHT) and the Central and Southern Pacific Railroad (CSPRR) within the Project Area to identify potential adverse visual and auditory impacts of the Project to the CNHT and potential visual impacts to the CSPRR and to make recommendations regarding mitigation of adverse effects or adverse impacts (Morgan et al., 2013).

#### 2.2.1.6 Project Design Features (Applicant-Committed Measures to Protect Resources)

The following design features are included in Noble's MSUPO. They are specifically intended to reduce potential damage to existing infrastructure, the natural environment, and historical sites.

**Cultural**

- If unknown cultural resources are found during operations, Noble would implement an Unanticipated Discovery Plan for Cultural Resources, which includes immediate stoppage of all work within thirty (30) meters of the discovery as directed by the BLM and immediate notification of the BLM AO.
- Prior to commencement of construction, Noble would inform all employees and contractors through job site safety orientations about compliance requirements

associated with the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, the Paleontological Resources Preservation Act, and the National Historic Preservation Act.

- Noble would suspend all operations that further disturb such materials and immediately contact the BLM AO. Construction would not resume until authorization to proceed is issued by the BLM AO.

**. Fire Management**

- Noble has prepared and would implement Fire Prevention Plan Measures (Appendix J).

**Hydrology**

- Project disturbance would avoid streams, creeks, springs, and wetland areas by 400 feet.
- Fueling would not occur within 400 feet of any riparian areas or standing or flowing surface water including streams, ponds, springs, seeps, and stock reservoirs.
- Noble would prepare and implement a Spill Prevention Plan in accordance with state regulations.
- Noble prepared and would implement a Stormwater Pollution Prevention Plan in accordance with state regulations.
- Noble would clean up diesel, hydraulic fuel, or other spills, including contaminated soils. All spill-related material would be hauled to an approved disposal site.
- Noble would comply with BLM's proposed rule to regulate hydraulic fracturing on public and Indian land (BLM, 2012a). The proposed rule provides disclosure to the public of chemicals used in hydraulic fracturing on public and Indian land, strengthens regulations related to well-bore integrity, and addresses issues related to flowback water. The rule has been proposed to provide useful information to the public and to assure that hydraulic fracturing is conducted in a way that adequately protects the environment.
- Noble would participate in FracFocus, which is a national hydraulic fracturing chemical registry managed by the Ground Water Protection Council and Interstate Oil and Gas Compact Commission; two organizations concerned with conservation and environmental protection. The primary purpose of the registry is to provide information concerning hydraulic fracturing and groundwater protection (FracFocus, 2014).
- Noble has entered into an MOU with the State of Nevada through the NDOM, the NDEP, and the Board of Regents of the Nevada System of Higher Education on behalf of the Desert Research Institute (DRI) to establish the Aquifer Quality Assessment Program (Aqua Program) to gather and share data and information on groundwater and geological conditions associated with the fate and transport of chemicals used for hydraulic fracturing. The MOU is included as Appendix F.

**Invasive, Non-Native Species**

- Noble would follow measures included in the Marys River Integrated Weed Management Plan (Appendix H) which includes treatment of weeds with herbicides.

**Public Health and Safety**

- Project-related vehicle traffic would be limited to designated roads included in the Proposed Action.
- Project-related vehicles would travel at speeds within set speed limits for main roads and would not exceed 20 mph on local and resource roads.
- Noble would conduct a Job Site Assessment meeting prior to kick off with the entire Project team and have daily safety tailgates each morning.

- All contractors would be required to have a Health and Safety Plan, which would include emergency response protocol, written and implemented specific to Project requirements.

**Vegetation**

- Noble would follow measures included in the Marys River Reclamation Plan (Appendix G).
- Noble would implement a baseline ecosite vegetation and weed survey for each well pad prior to construction to ensure that a proper seed mix design would be applicable to ecosites already existing at the location and to ensure protection from erosion due to cattle grazing during interim reclamation.

**Wildlife and Special Status Species**

- Noble has prepared and would follow BMPs to protect greater sage-grouse and greater sage-grouse habitat (Exhibit F in the MSPUO).
- Noble would inform employees and contractors that harassing (including feeding, approaching, pursuing, or otherwise intentionally disturbing) or shooting of wildlife would not be permitted; dogs may not be brought to the Project Area; no firearms would be allowed on-site; and there would be no littering, including trash that was not secured properly and has been dispersed by wind.
- Noble would conduct pre-disturbance surveys for pygmy rabbits before each well pad is constructed.
- Noble has committed to voluntarily monitor active leks as described in the Greater Sage Grouse Management Plan (see Appendix K).
- Noble has prepared a BBCS that includes the following measures in order to protect avian and bat species:
    - If vegetation clearing is planned during the core nesting period (March 15 through July 31), surveys would be conducted 7 to 10 days prior to clearing. If nests are found within areas where vegetation would be removed, surface disturbances would not occur until after July 31. If no nests are found, clearing would be possible with no timing limitation if conducted within 14 days of the survey.
    - All open pipes would be capped or filled to prevent birds from becoming trapped.
    - All exhaust stacks would be screened and outfitted with anti-perching devices to prevent bird or bat entry and to discourage perching, roosting, and nesting. Caps and screens would be checked regularly to ensure they are effective.
    - Garbage would be removed at frequent intervals to avoid attracting scavengers and avian predators to the pad vicinities.
    - No vehicles would be parked off pad or road disturbance to avoid contamination, crushing nests, or ignition of fires.
    - The maximum speed limit for all Project vehicles in the Project Area will be no more than 20 mph.
    - Employees and contractors must stay on pad areas for the duration of the shift and not wander into surrounding areas.
    - All reasonable, prudent, and effective measures such as using suitable mufflers on all internal combustion engines and implementation of only authorized access would be used to reduce potential impacts to migratory birds and bats.

### 2.2.2 NO ACTION ALTERNATIVE

In accordance with NEPA and CEQ regulations that require that a No Action Alternative be presented in all environmental analyses in order to serve as a "base line" or "benchmark" from which to compare all proposed "action" alternatives, a No Action Alternative is analyzed in this EA.

Under the No Action Alternative, the Wells Field Manager would not approve Noble's MSUPO and the Proposed Action would not be implemented.

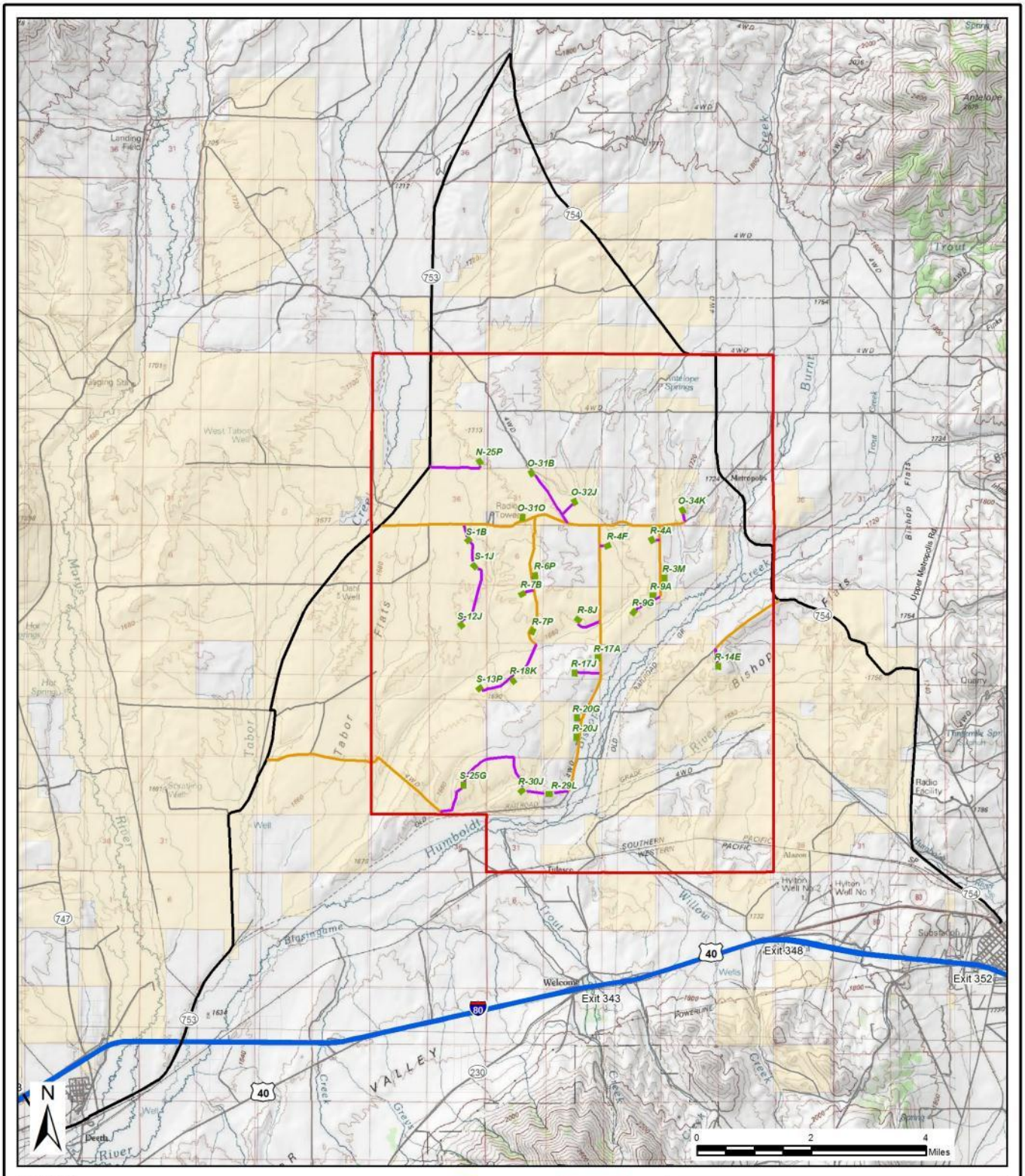
### 2.2.3 VISUAL ALTERNATIVE

This alternative was developed to reduce indirect visual impacts that the Proposed Action may have on the eligible sections of the CNHT as identified in the visual and auditory assessment (Morgan et al., 2013).

Under the Visual Alternative, six well pads identified in the Proposed Action would be excluded from consideration as one of the 33 potential locations. Well pads R-27M, R-27F, R-27I, R-21K, R-21A, and R-10N, located in the southwest portion of the Project Area, would not be included in this alternative. The 27 potential well pads in the Visual Alternative are listed in Table 2.2-13 and shown on Map 2.2-2. The federal leases that could be potentially affected under the Visual Alternative are the same as those that could be affected under the Proposed Action because the six wells pad eliminated under the Visual Alternative are on private surface and private minerals. Table 2.2-2 (Section 2.2.1.1) lists the potentially affected federal leases, the well pads that would apply to the lease, and summarizes the lease stipulations.

**Table 2.2-13**
**Potential Well Pad Locations with Surface and Mineral Ownership under the Visual Alternative**

| Well Pad Name | T | R | Sec | Surface Qtr/Qtr | Surface Ownership | Mineral Ownership |
|---|---|---|---|---|---|---|
| N-25P | 39N | 60E | 25 | SESE | Federal | Private |
| O-31B | 39N | 61E | 31 | NWNE | Federal | Private |
| O-32J | 39N | 61E | 32 | NWSE | Federal | Federal |
| O-31O | 39N | 61E | 31 | SWSE | Federal | Private |
| S-1B | 38N | 60E | 1 | SWNE | Federal | Private |
| S-1J | 38N | 60E | 1 | NESE | Federal | Private |
| S-12J | 38N | 60E | 12 | NWSE | Federal | Federal |
| R-6P | 38N | 61E | 6 | SESE | Federal | Federal |
| R-7P | 38N | 61E | 7 | SESE | Federal | Federal |
| S-13P | 38N | 60E | 13 | SESE | Federal | Private |
| R-18K | 38N | 61E | 18 | NESW | Federal | Federal |
| R-4F | 38N | 61E | 4 | SWNW | Federal | Federal |
| R-4A | 38N | 61E | 4 | NENE | Federal | Federal |
| O-34K | 39N | 61E | 34 | SESW | Federal | Federal |
| R-9A | 38N | 61E | 9 | NENE | Federal | Private |
| R-9G | 38N | 61E | 9 | SWNE | Federal | Private |
| R-8J | 38Nn | 61E | 8 | NWSE | Federal | Federal |
| S-25G | 38N | 60E | 25 | NWSE | Federal | Private |
| R-30J | 38N | 61E | 30 | NWSE | Federal | Federal |
| R-7B | 38N | 61E | 7 | NWNE | Federal | Federal |
| R-29L | 38N | 61E | 29 | NWSW | Private | Private |
| R-20J | 38N | 61E | 20 | NWSE | Private | Private |
| R-20G | 38N | 61E | 20 | SWNE | Private | Private |
| R-17J | 38N | 61E | 17 | NWSE | Private | Private |
| R-17A | 38N | 61E | 17 | NENE | Private | Private |
| R-14E | 38N | 61E | 14 | SWNW | Private | Private |
| R-3M | 38N | 61E | 3 | SWSW | Private | Private |




**Legend**

- Project Boundary
- Surface Ownership
  - Federal
  - Private
- General Access
  - Existing - No Improvement
  - Existing - Needs Improvement
  - New - Proposed
  - Interstate
  - Existing Secondary Roads



## MAP 2.2-2

**Visual Alternative**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014

With the exception of the number of potential well pads considered for exploration and the extent of associated surface disturbance for roads including turnouts (two are removed), all components of the Visual Alternative would be the same as those described for the Proposed Action. During the Construction/Drilling Phase, Noble would construct up to 20 well pads; drill and complete a maximum of 20 exploration wells over two or more years; and potentially drill on-site water supply wells and/or construct a disposal/injection well. Any water supply and/or disposal/injection wells would be drilled on one of the 20 well pads. Once wells are drilled and completed, economically viable wells would enter the Production/Operations Phase and operate for up to 20 years.

All surface disturbance associated with the Visual Alternative would occur during the Construction/Drilling Phase. Table 2.2-14 lists the maximum potential short-term and long-term disturbances for each Project component. Short-term disturbance includes all disturbances for well pads and roads that would occur during the Construction/Drilling Phase. Following interim reclamation of temporary disturbances associated with road and well pad construction, long-term disturbance would remain throughout the Production/Operations Phase. The estimated disturbances shown in Table 2.2-14 include surface disturbances on BLM-administered lands and on private lands.

**Table 2.2-14**
**Identified Potential Short-Term and Long-Term Surface Disturbance as a Result of Oil and Gas Exploration under the Visual Alternative**

| Component | Potential Length or Number of Sites | Potential Short-Term Surface Disturbance (acres)[7] | | | Potential Long-Term Surface Disturbance (acres)[7] | | |
|---|---|---|---|---|---|---|---|
| | | Federal | Private | Total | Federal | Private | Total |
| Well Pads[1,2] | 27 | 140.2 | 49.1 | 189.3 | 100.0 | 35.0 | 135.0 |
| New Resource Roads[3] | 5.7 miles | 19.2 | 2.7 | 21.9 | 13.2 | 1.9 | 15.1 |
| Upgraded Resource Road[3] | 1.4 miles | 0.0 | 6.0 | 6.0 | 0.0 | 4.3 | 4.3 |
| Turnouts[4] | 5 | 0.0 | 0.0 | 0.0 | 0.7 | 0.0 | 0.7 |
| New Local Roads[5] | 4.6 miles | 19.1 | 1.2 | 20.3 | 13.7 | 0.9 | 14.6 |
| Upgrade Local Roads[5,6] | 16.9 miles | 49.3 | 22.5 | 71.8 | 35.1 | 16.2 | 51.3 |
| **Total** | | **227.8** | **81.5** | **309.3** | **162.7** | **58.3** | **221.0** |

[1] Noble identified 27 potential well pad locations and all 27 well pads are included with these estimates; however, no more than 20 of the 27 potential locations would be constructed. Eleven of the proposed well pads are identified on federal surface with federal minerals, nine are identified on federal surface with private minerals, and 7 are identified on private surface with private minerals.

[2] Short-term well pad disturbance before interim reclamation is estimated at 7 acres for the first six well pads and 6 acres for the remaining 14 well pads, but 7 acres is used here for all well pads. Long-term disturbance after interim reclamation could be up to 5 acres per well pad, and would average 3.5 acres.

[3] Based on 16 foot travel surface with 5 feet for ditches (2.5 feet on either side) for resource roads' long-term disturbance. Ten feet of temporary use area (short-term disturbance) would be required for construction.

[4] Turnouts would be 10 feet in width by 600 feet in length. Short-term disturbance is not noted for turnouts because it would be within the temporary disturbance for roads; however, it is noted as long-term disturbance.

[5] Upgraded existing local roads and new local roads would have 24 foot travel surface with 5 feet for ditches (2.5 feet on either side) representing long-term disturbance. An additional 10 feet of temporary use area (short-term disturbance) would be required for construction. Disturbance would include blading and removal of vegetation.

[6] Existing roads that require upgrading are 12.7 feet wide. Existing disturbance (approximately 43.3 acres) is not subtracted from the proposed disturbance footprint – all new disturbance is assumed.

[7] Total acres are taken from GIS disturbance footprint model and are not calculated by multiplying width times length divided by 43,560.

Under the Visual Alternative, up to 18.3 miles of existing local and resource roads could require upgrading and up to 10.3 miles of new local and resource roads could be constructed. Other Project components, including well pad construction, drilling and completion; water requirements and water supply; workforce and traffic; production/operations; abandonment and reclamation; Project schedule; site specific resource surveys; and Project Design Features (applicant-committed measures to protect resources) that apply to the Visual Alternative are unchanged from those described in Section 2.2.1 for the Proposed Action.

The actual amount of disturbance (for up to 20 well pads and associated access roads) under the Visual Alternative would be the same as that for the Proposed Action; however, disturbance would not occur for well pads R-27M, R-27F, R-27I, R-21K, R-21A, and R-10N.

Table 2.2-15 summarizes the differences between potential identified short-term and long-term surface disturbance under the Proposed Action and the Visual Alternative (for 33 well pads and 27 well pads, respectively).

**Table 2.2-15**
**Comparison of Potential Short-Term and Long-Term**
**Surface Disturbance under the Proposed Action and Visual Alternative**

| Alternative and Project Component | Potential Length or Number of Sites | Potential Short-Term Surface Disturbance (acres) | | | Potential Long-Term Surface Disturbance (acres) | | |
|---|---|---|---|---|---|---|---|
| | | Federal | Private | Total | Federal | Private | Total |
| **Well Pads** | | | | | | | |
| Proposed Action | 33 | 140.2 | 91.1 | 231.3 | 100.0 | 65.0 | 165.0 |
| Visual Alternative | 27 | 140.2 | 49.1 | 189.3 | 100.0 | 35.0 | 135.0 |
| Difference[1] | -6 | 0.0 | -42.0 | -42.0 | 0.0 | -30.0 | -30.0 |
| **New Roads[2]** | | | | | | | |
| Proposed Action | 12.6 miles | 45.1 | 8.1 | 53.2 | 32.0 | 5.6 | 37.6 |
| Visual Alternative | 10.3 miles | 38.3 | 3.9 | 42.2 | 26.9 | 2.8 | 29.7 |
| Difference[1] | -2.3 miles | -6.8 | -4.2 | -11.0 | -5.1 | -2.8 | -7.9 |
| **Upgraded Roads[2]** | | | | | | | |
| Proposed Action | 20.5 miles | 62.2 | 35.1 | 97.3 | 46.3 | 26.2 | 72.5 |
| Visual Alternative | 18.3 miles | 49.3 | 28.5 | 77.8 | 35.1 | 20.5 | 55.6 |
| Difference[1] | -2.2 miles | -12.9 | -6.6 | -19.5 | -11.2 | -5.7 | -16.9 |
| **Turnouts** | | | | | | | |
| Proposed Action | 7 | 0.0 | 0.0 | 0.0 | 0.7 | 0.3 | 1.0 |
| Visual Alternative | 5 | 0.0 | 0.0 | 0.0 | 0.7 | 0.0 | 0.7 |
| Difference[1] | -2 | -0.0 | -0.0 | -0.0 | -0.0 | -0.3 | -0.3 |
| **Total** | | | | | | | |
| **Proposed Action** | | 247.5 | 134.3 | 381.8 | 179.0 | 97.1 | 276.1 |
| **Visual Alternative** | | 227.8 | 81.5 | 309.3 | 162.7 | 58.3 | 221.0 |
| **Difference[1]** | | -19.7 | -52.8 | -72.5 | -16.3 | -38.8 | -55.1 |

[1] A negative number indicates fewer miles, turnouts and less surface disturbance identified under the Visual Alternative as compared to the Proposed Action.
[2] Includes resource and local roads.

## 2.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

If an alternative is considered during the environmental analysis process but the agency decides not to analyze the alternative in detail, the agency must identify those alternatives and briefly explain why they were eliminated from detailed analysis (40 CFR 1502.14).

Concerns raised during scoping have been addressed through mitigation measures for each resource or were included in the Project Design Features; therefore, no alternatives were considered other than the Proposed Action, the No Action Alternative, and the Visual Alternative.

# CHAPTER 3 - AFFECTED ENVIRONMENT AND EFFECTS

## 3.1 INTRODUCTION

Elements specified by statue, regulation, or Executive Order (EO) are described and analyzed in this section. Any element not present within the Project Area or any element that would not be affected by the Proposed Action Alternative, the No Action Alternative, or the Visual Alternative is not analyzed in this document. Therefore, this section provides a description of the human and natural environmental resources that could be affected by the Proposed Action Alternative, the No Action Alternative, and the Visual Alternative.

BLM Resource Specialists, experts in their respective fields, determined which resources would be brought forward for analysis by evaluating whether the resources were present within the Project Area and whether the Proposed Action would impact those resources. Resources that could potentially be impacted are analyzed in this EA. Table 3.1-1 presents that resource evaluation.

**Table 3.1-1**
**Potentially Impacted Resources**

| Resources[1] | Not Present | No Impact | Potentially Impacted | Mitigation necessary |
|---|---|---|---|---|
| Air Quality and Climate | ☐ | ☐ | ☒ | ☒ |
| Geology and Mineral Resources | ☐ | ☐ | ☒ | ☐ |
| Soils | ☐ | ☐ | ☒ | ☒ |
| Hydrology | ☐ | ☐ | ☒ | ☒ |
| Invasive, Non-native Species | ☐ | ☐ | ☒ | ☒ |
| Vegetation | ☐ | ☐ | ☒ | ☒ |
| Forestry and Forest Products | ☒ | ☐ | ☐ | ☐ |
| Migratory Birds | ☐ | ☐ | ☒ | ☒ |
| Special Status Species | ☐ | ☐ | ☒ | ☒ |
| Wildlife and Fisheries | ☐ | ☐ | ☒ | ☒ |
| Cultural Resources | ☐ | ☐ | ☒ | ☒ |
| National Historic Trails | ☐ | ☐ | ☒ | ☒ |
| Native American Traditional Values | ☐ | ☐ | ☒ | ☐ |
| Paleontological Resources | ☐ | ☐ | ☒ | ☐ |
| Visual Resources Management | ☐ | ☐ | ☒ | ☒ |
| Socioeconomic | ☐ | ☐ | ☒ | ☐ |
| Environmental Justice | ☐ | ☐ | ☒ | ☐ |
| Transportation and Access | ☐ | ☐ | ☒ | ☒ |
| Wastes (Hazardous or Solid) | ☐ | ☐ | ☒ | ☒ |
| Livestock Grazing | ☐ | ☐ | ☒ | ☒ |
| Recreation | ☐ | ☐ | ☒ | ☒ |
| Land Tenure, ROW, Other Uses | ☐ | ☐ | ☒ | ☒ |
| Fire Management | ☐ | ☐ | ☒ | ☒ |
| Special Designations, ACECs | ☒ | ☐ | ☐ | ☐ |
| Wilderness, Including Wilderness Study Areas and Wilderness Characteristics | ☒ | ☐ | ☐ | ☐ |
| Wild Horses | ☒ | ☐ | ☐ | ☐ |

[1]See Statute: NV-2009-030, BLM Manual, regulation or order that may require an element be addressed in a NV BLM EA.

This chapter presents comparative analyses of the environmental consequences (i.e., direct and indirect effects) on the affected environment stemming from implementation of the Proposed Action, No Action Alternative, and the Visual Alternative. Environmental impact analysis was based upon available data and literature from state and federal agencies, peer-review scientific literature, and resource studies conducted in the Project Area. Comparison of impacts is intended to provide an impartial assessment to help inform the decision-maker and the public. Actions resulting in adverse impacts to one resource may impart a beneficial impact to other resources. For each resource analyzed, environmental consequences include:

- **direct impacts –** impacts that are caused by the action, and that occur at the same time and in the same general location as the action.

- **indirect impacts –** impacts that occur at a different time or in a different location than the action to which the impacts are related.

- **short or long-term impacts –** unless stated otherwise, the short-term or long-term aspects of impacts are described. For the purposes of this EA, short-term impacts occur during or after the activity or action and may continue for up to 2 years. Long-term impacts occur beyond the first 2 years.

The predicted intensity and duration of effects from implementation of the Proposed Action for each resource were evaluated to determine how these effects could be avoided or reduced through the application of mitigation measures. The Project Design Features included in Noble's MSUPO were evaluated for their ability to reduce expected effects. The need for additional mitigation measures was then determined for each resource, based on the expectation that potential effects could be further reduced or avoided. Mitigation measures are included for each resource, if appropriate.

## Cumulative Effects

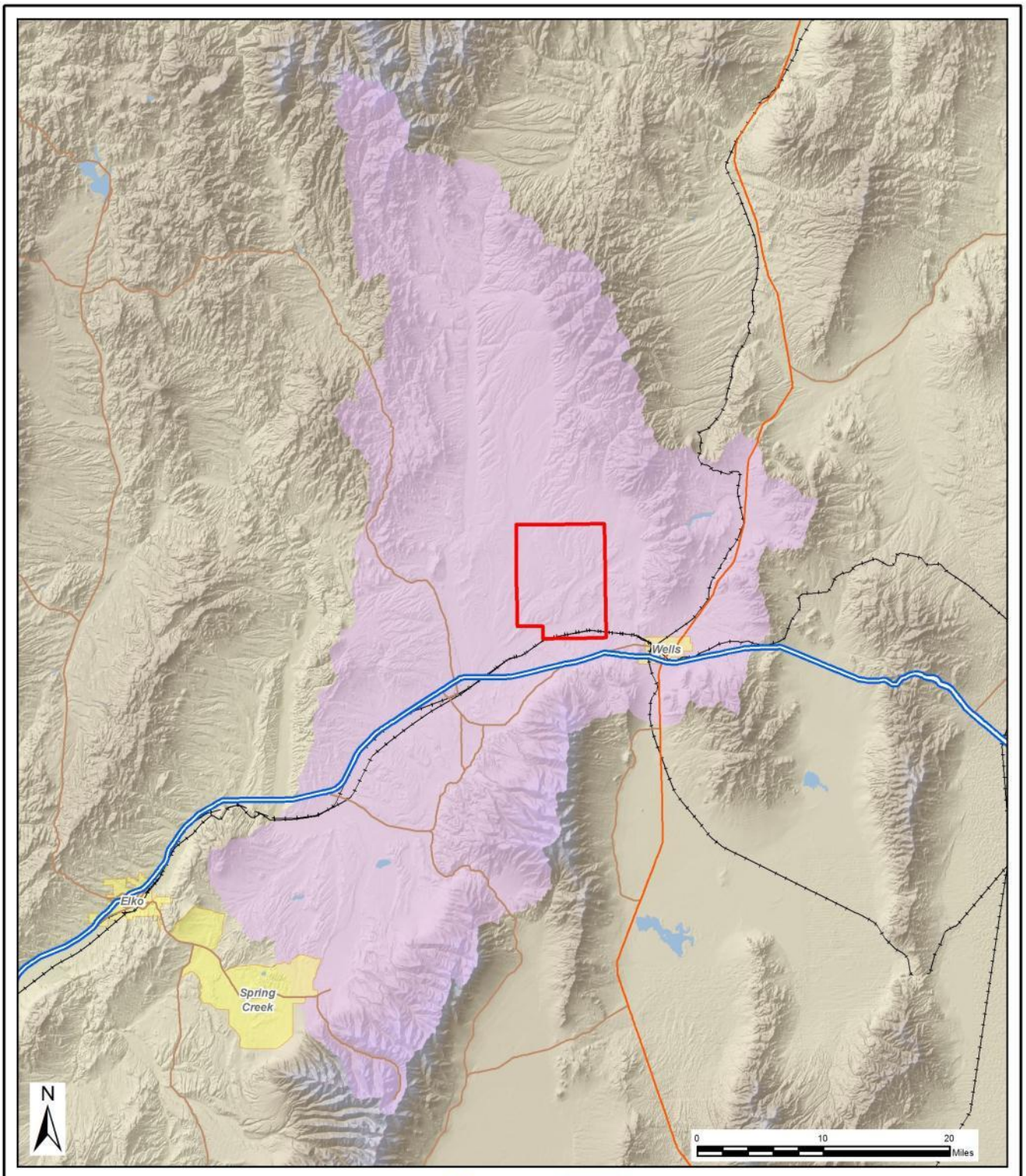
NEPA requires federal agencies to consider the cumulative effects of proposals under their review. Cumulative effects are defined in the CEQ regulations 40 CFR §1508.7 as "…the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency…or person undertakes such other actions." Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time. The CEQ states that the cumulative effects analyses should be conducted on the scale of human communities, landscapes, watersheds, or "airsheds" using the concept of "project impact zone" or more simply put, the area that might be affected by the Proposed Action.

Table 3.1-2 provides the rationale for the cumulative effects analysis by resource and identifies the Cumulative Effects Study Areas (CESAs) and associated acreages for each resource, where a CESA is appropriate. Cumulative effects are analyzed within the specific resource sections below. Maps 3.1-1 through 3.1-5 depict the CESA boundaries described in Table 3.1-2.

**Table 3.1-2**
**Cumulative Effects Rationale**

| Resource | Cumulative Effects Study Areas (CESAs) | | |
|---|---|---|---|
| | **CESA Boundary** | **Acres** | **CESA Rationale** |
| Air Quality and Climate | Watershed | 1,078,218 | The boundary of seven subwatersheds within the Upper Humboldt watershed – Tabor Creek (HUC 1604010103), Bishop Creek (HUC 1604010102), Town Creek-Humboldt River (HUC 1604010101), Reed Creek-Humboldt River (HUC 1604010107), Lower Marys River (HUC 1604010105), Upper Marys River (HUC 1604010104), and Lamoille Creek (HUC 1604010106) – has been used as the geographic scope for the cumulative effects analysis for these resources. The combination of these seven subwatersheds comprises an area which encompasses the Project Area and includes most of the activities which could impact resources in the Project Area. This CESA also encompasses the Marys River and the Star Valley air basins. Potential impacts of the Project would not be likely to result in any issues outside of this area. |
| Hydrology | | | |
| Invasive, Non-Native Species | | | |
| Livestock Grazing | | | |
| Migratory Birds, Bird and Bat Special Status Species, and Fisheries | | | |
| Recreation | | | |
| Soils | | | |
| Vegetation | | | |
| Cultural Resources, Fire Management, Geology and Minerals, Land Tenure, Native American Traditional Values, Paleontological Resources, Visual Resources, and Wastes | Project Area | 39,444 | Effects are not anticipated outside the Project Area or would be, at best, speculative at any larger scale. |
| California National Historic Trail | Granite Pass to Humboldt River Segment | N/A | This CESA includes an area defined by the National Park Service (NPS) document entitled a Comprehensive Management and Use Plan (CMP) for the CNHT. The CMP designates a “high potential” segment known as the Granite Pass to Humboldt River (Segment 14) of the CNHT (NPS 1999:207), the southern border of which is immediately southeast of the Project boundary. The CESA includes Segment 14 and extends along the CNHT approximately 40 miles south of the Project boundary. The CESA is linear in nature and is approximately 140 miles in length. |
| Greater Sage-grouse [1] | O’Neil PMU | 1,014,670 | The Project Area is located in the southern part of the O’Neil Population Management Unit for greater sage-grouse. |
| General Wildlife and Special Status Species (excluding bird and bat species) [1] | Watershed north of I-80 | 689,177 | Crossing I-80 would present a barrier to most of these species; therefore, the portion of the watershed north of I-80 was used for analysis. |
| Pronghorn [1] | Herd Units 072, 074, 075 | 1,177,094 | The Project Area is located in the southern portion of Unit 075, and using the boundary of the three units provides perspective of the seasonal range use in relation to the Project. |
| Socioeconomics, Environmental Justice | Elko County | 10,988,691 | The Project Area is located in the central portion of Elko County, which includes the major population centers and roadway systems in northeast Nevada. |
| Transportation and Access | | | |

[1] NDOW was consulted in the development of these CESAs.




**Legend**

Project Area

Watershed Boundary

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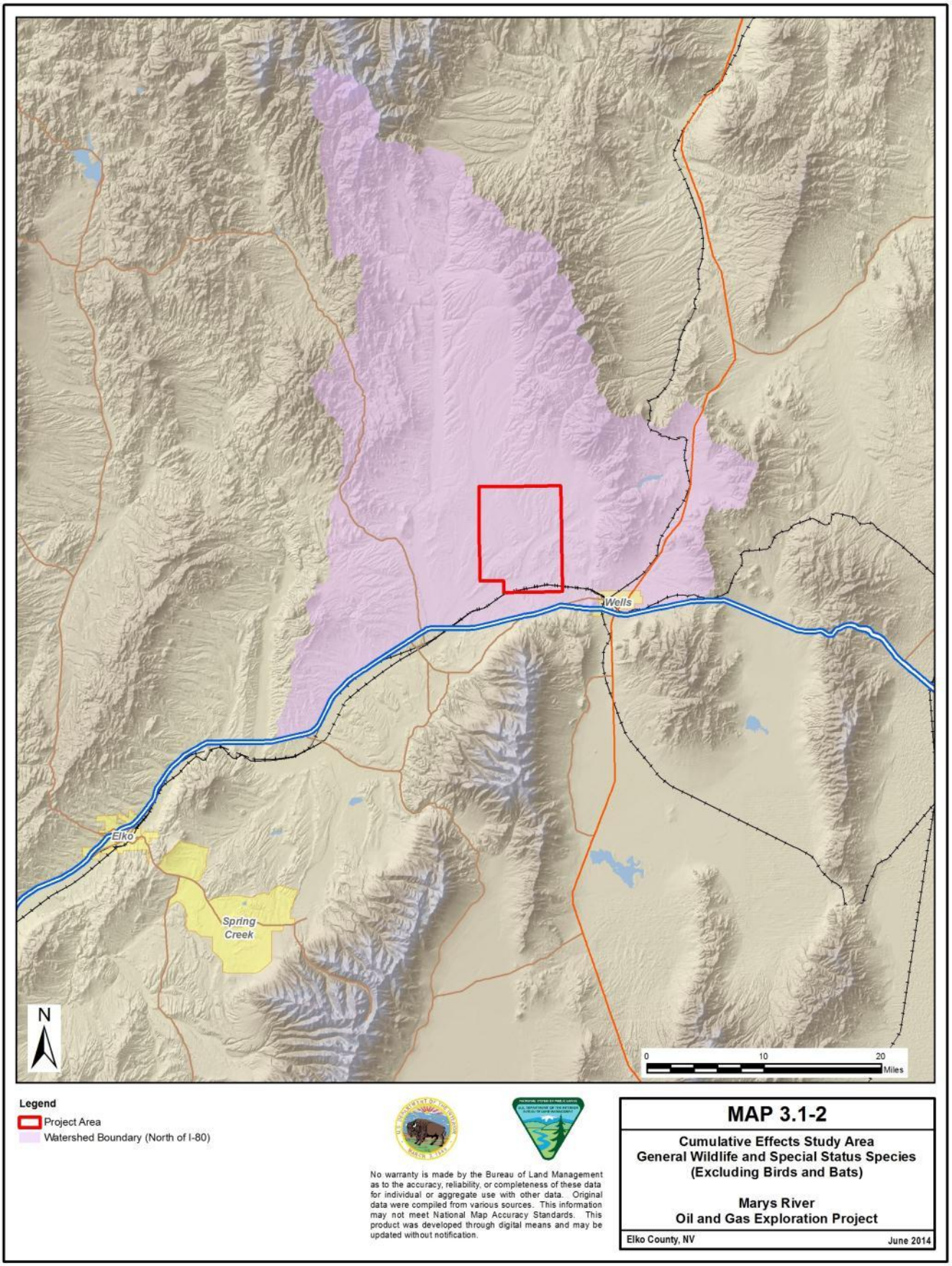
## MAP 3.1-1

**Cumulative Effects Study Area**
**Migratory Birds and Bird and Bat Special Status Species (and other resources)**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014

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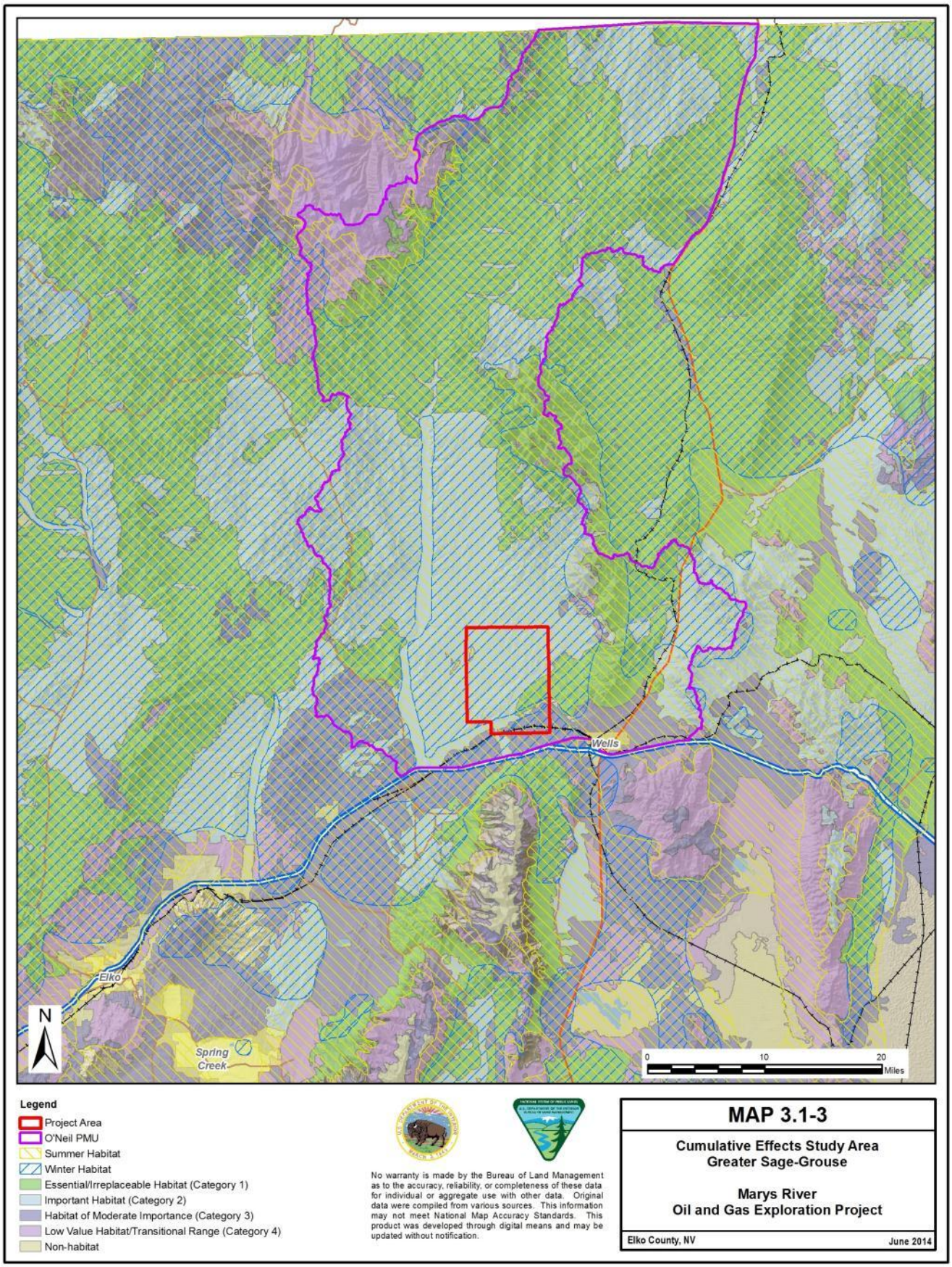
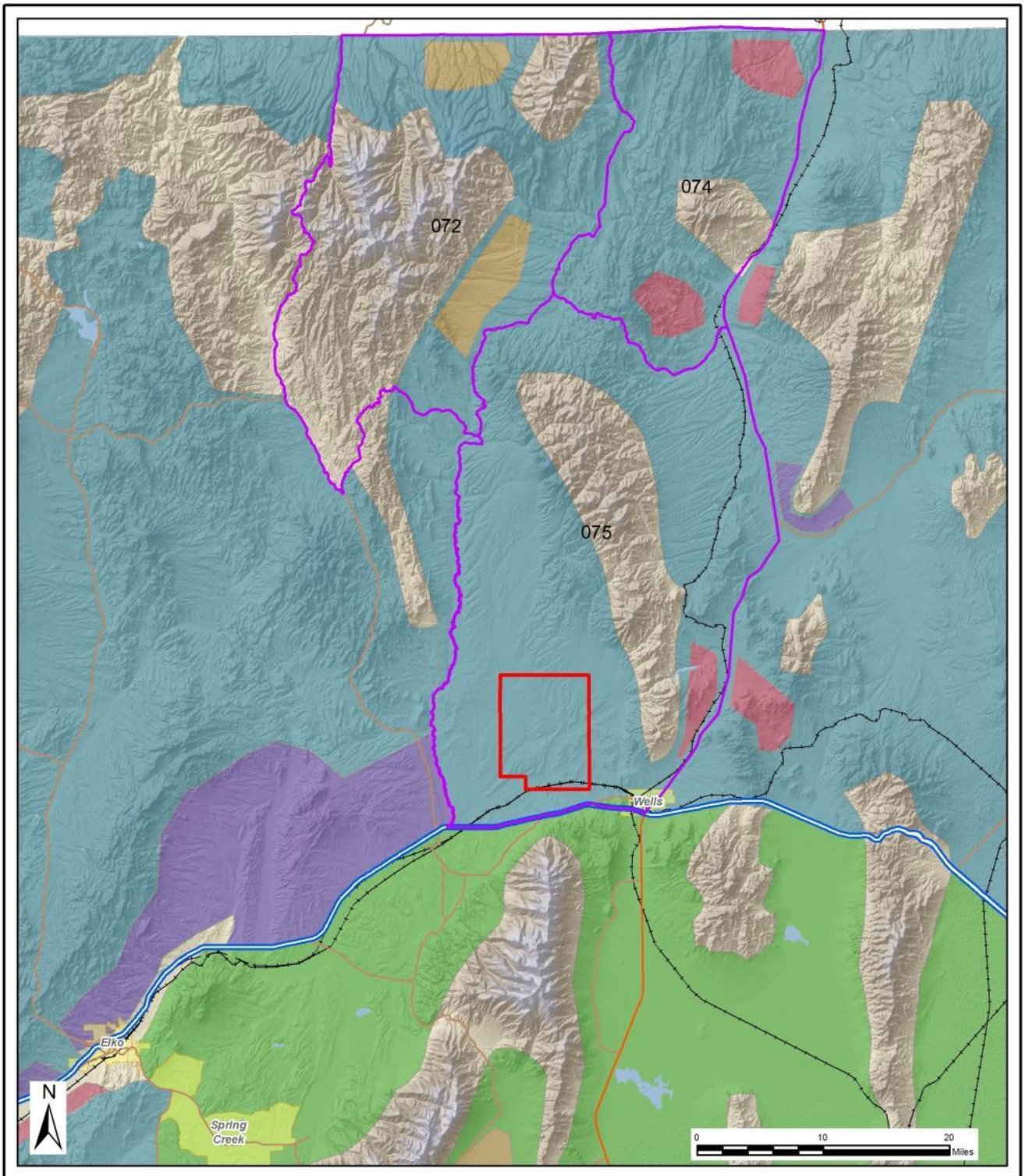
## MAP 3.1-2

**Cumulative Effects Study Area**
**General Wildlife and Special Status Species**
**(Excluding Birds and Bats)**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014


Wells
Elko
Spring Creek
N
0
10
20
Miles
Legend
Project Area
O'Neil PMU
Summer Habitat
Winter Habitat
Essential/Irreplaceable Habitat (Category 1)
Important Habitat (Category 2)
Habitat of Moderate Importance (Category 3)
Low Value Habitat/Transitional Range (Category 4)
Non-habitat
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
MAP 3.1-3
Cumulative Effects Study Area
Greater Sage-Grouse
Marys River
Oil and Gas Exploration Project
Elko County, NV
June 2014




**Legend**

- Project Area
- Pronghorn (Units 072, 074, 075)

**Pronghorn Seasonal Ranges**

- Crucial Summer
- Crucial Winter
- Summer Range
- Winter Range
- Year-round

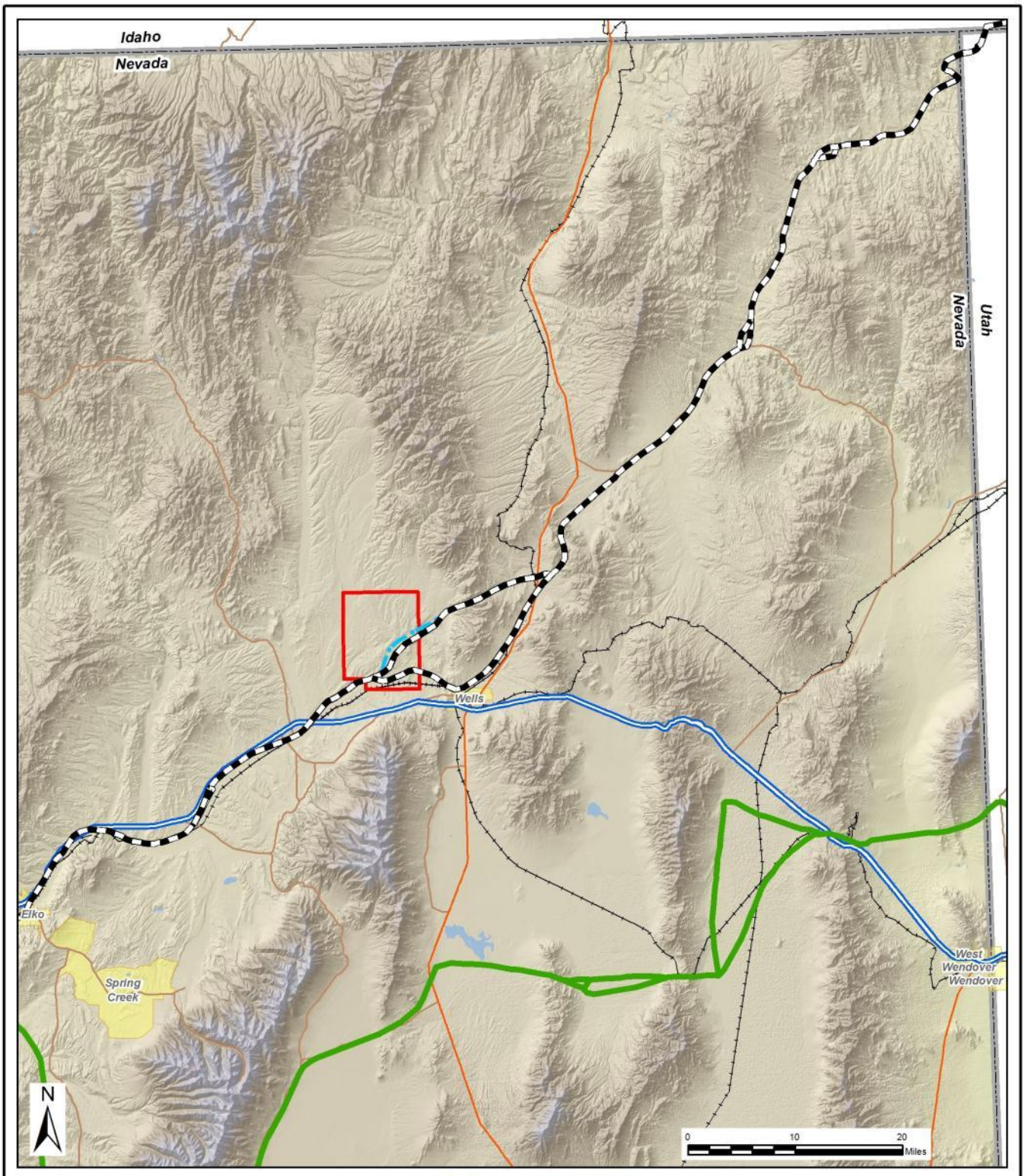


## MAP 3.1-4

**Cumulative Effects Study Area**
**Pronghorn**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014




**Legend**

- Project Area
- CNHT - Granite Pass to Humboldt River
- CNHT, Bishop Creek Route as Identified by Fryman and Call (2011)
- Congressionally Designated, Main CNHT Route (or Bishop Creek Route)



## MAP 3.1-5

**Cumulative Effects Study Area**
**California National Historic Trail**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014

The Reasonably Foreseeable Future Actions (RFFAs) describe existing facilities identified within and adjacent to the Project Area, as well as proposed projects which may be constructed in the area in the reasonably foreseeable future. To be included in the RFFAs, a proposed future action must have a high probability of occurrence and be defined well enough to be considered in any cumulative impact analysis. On BLM-administered lands, foreseeable projects are those for which the BLM has received applications. The BLM LR2000 database was queried for closed, authorized, and pending rights-of-way and surface management features (see Table 3.1-3 by authorization number and project name/type). The acreages of those features are included in the specific resource sections.

**Table 3.1-3**
**BLM LR2000 Database Query**

| Authorization Number | Project Name/Type |
|---|---|
| NVN84650 | Ruby Pipeline – natural gas pipeline |
| N7639 | Sierra Pacific – power transmission line |
| N1027 | Wells Rural Electric power transmission line |
| N89911 | Wells Rural Electric power transmission line |
| N17084 | Wells Rural Electric power transmission line (within multiple use right-of-way corridor) |
| CC021089 | Telephone line |
| N65550 | Fiber optic cable (within multiple use right-of-way corridor) |
| N60910 | Citizens Communications – buried telephone line |
| CC018412 | Overhead power line |
| N39938 | Walker Wincup Gamble – overhead telephone line |
| CC04693 | Railroad |
| Elko 04086 | Railroad |
| Elko04897 | Railroad |
| CC05150 | Railroad |
| N46208 | Elko County Road |
| N60305 | BLM road |
| N54651 | BLM road |
| N55607 | BLM road |
| N5686 | Forest Service – road |
| N46756 | Elko County Road |
| N52546 | Elko County Road |
| N7470 | Forest Service – road |
| N89748 | Road |
| NEV065706 | Road |
| N47000 | Elko County Road |
| N53406 | Forest Service – wilderness designation area |
| N55624 | BLM water pipelines |
| NVN83165 | Bishop Creek Dam |

Also identified, but not individually listed, were stock ponds, reservoirs, springs, canals, and numerous water pipelines/conduits.

Generally, past, present, and reasonably foreseeable activities/events (natural and man-made) and the unintended consequences of those activities/events within or in the vicinity of the Project Area that the BLM has determined could have an influence on the resources in the area include:

- Livestock grazing;
- Farming;
- Oil and gas development;
- Mining;
- Dispersed motorized and mechanized recreation;
- Hunting and camping;
- Fire;
- Drought;
- Wildlife utilization; and
- Weed proliferation.

The identified past, present, and reasonably foreseeable actions/consequences have contributed to the current state of the Project Area and were considered when analyzing cumulative effects in the individual resource sections.

## 3.2 PHYSICAL RESOURCES

### 3.2.1 AIR QUALITY AND CLIMATE

#### 3.2.1.1 Current Conditions

Regional air quality is influenced by a combination of factors including climate, meteorology, the magnitude and spatial distribution of local and regional air pollution sources, and the chemical properties of emitted pollutants. Within the lower atmosphere, regional and local scale air masses interact with regional topography to influence atmospheric dispersion and transport of pollutants. The following sections summarize the climatic conditions and existing air quality within the Project Area and surrounding region.

##### 3.2.1.1.1 Regional Climate

The Project Area is located in Elko County, north of the Humboldt National Forest and west of the Snake Mountains. The climate is arid and characterized by warm, dry summers and cold, wet winters. The nearest long-term meteorological measurements were collected at Wells (1895-2004), located 5 miles east of the Project Area at an elevation of 5,650 feet above mean sea level - amsl (Western Regional Climate Center – WRCC, 2013).

The annual average total precipitation at Wells is 9.85 inches, with annual totals ranging from 4.96 inches (2001) to 20.67 inches (1983). Precipitation is greatest in the winter and spring. Average monthly precipitation ranges from 0.40 inch (July) to 1.19 inches (May). An average of 49.3 inches of snow falls during the year (annual high of 103.5 inches in 1955), with the majority of snow distributed evenly between November and March.

The region has cool temperatures, with average temperature (in degrees Fahrenheit - ˚F) ranging between 11.2˚F and 35.8˚F in January to between 48.0˚F and 88.3˚F in July. Extreme temperatures have ranged from -36˚F (1990) to 104˚F (1910). The frost free period generally occurs from June to August. Table 3.2-1 shows the mean monthly temperature ranges and total precipitation amounts.

**Table 3.2-1**
**Mean Monthly Temperature Ranges and Total Precipitation Amounts, Wells Nevada (1985-2004)[1]**

| Month | Average Temperature Range (°F) | Total Precipitation (inches) |
|---|---|---|
| January | 11.2 - 35.8 | 1.01 |
| February | 16.3 - 39.9 | 0.86 |
| March | 22.3 - 47.9 | 1.05 |
| April | 27.8 - 57.7 | 0.88 |
| May | 34.5 - 67.2 | 1.19 |
| June | 41.4 - 77.6 | 0.91 |
| July | 48.0 - 88.3 | 0.40 |
| August | 45.5 - 86.6 | 0.39 |
| September | 36.5 - 76.4 | 0.58 |
| October | 27.0 - 63.2 | 0.75 |
| November | 19.4 - 46.7 | 0.93 |
| December | 12.1 - 37.0 | 0.92 |
| **Annual** | **44.4 (mean)** | **9.85 (mean)** |

[1] WRCC, 2013.

The closest comprehensive wind measurements are collected 43 miles southwest of the Project Area at the Elko National Weather Service (NWS) meteorological monitoring station (NDEP, 2013a). To describe the wind flow pattern for the region, a wind rose for Elko for available years 2007 through 2010 is presented in Figure 3.2-1. From this information, it is evident that the winds originate from the south to southwest approximately 44 percent of the time.

The frequency and strength of winds greatly affect the transport and dispersion of air pollutants. The annual mean wind speed is 6.4 mph, a moderate wind speed indicating the presence of good dispersion and mixing of any potential pollutant emissions resulting from Project sources (see Tables 3.2-2 and 3.2-3).

**Table 3.2-2**
**Wind Speed Distribution, Elko, Nevada, 2007 through 2011[1]**

| Wind Speed (m/sec) | Frequency (%) |
|---|---|
| 0 – 2.1 | 41.80 |
| 2.1 – 3.6 | 28.68 |
| 3.6 - 5.7 | 16.01 |
| 5.7 – 8.8 | 8.31 |
| 8.8 – 11.1 | 1.39 |
| Greater than 11.1 | 0.37 |

[1] NDEP, 2013a.

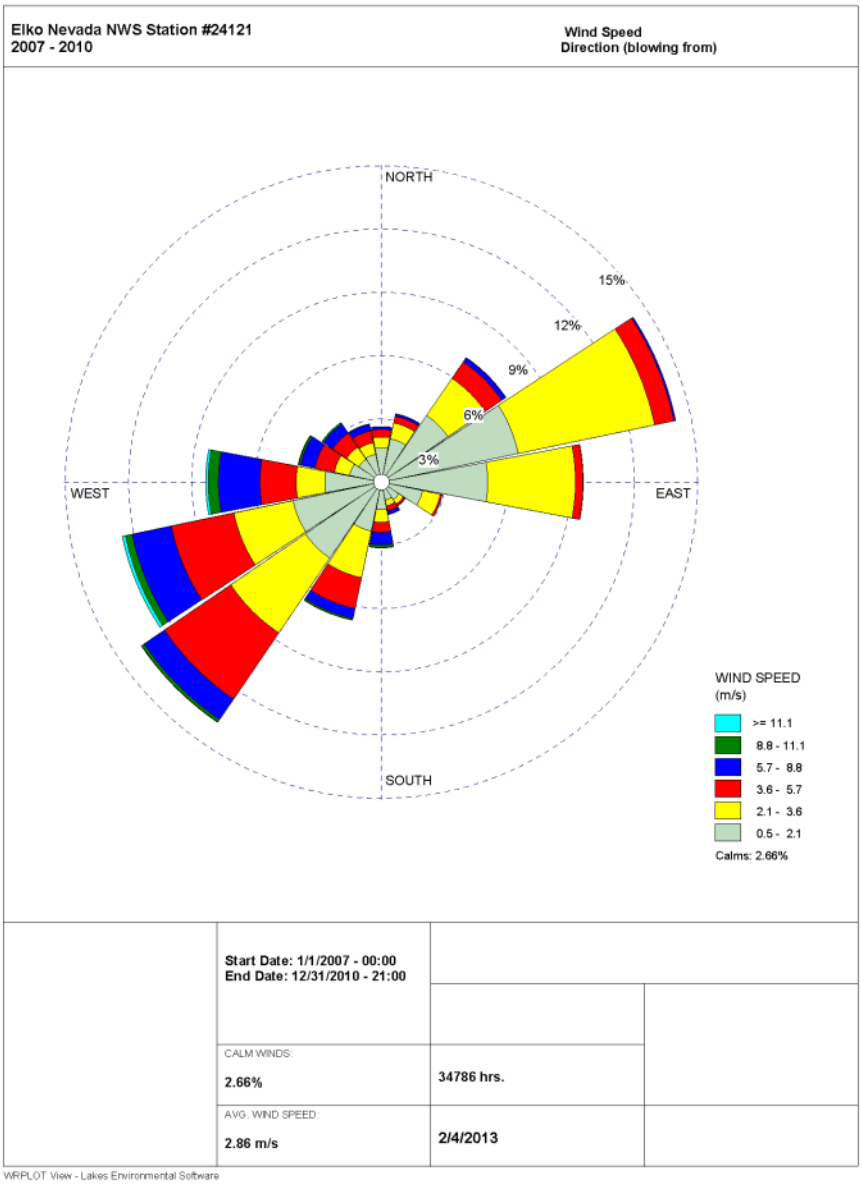



**Figure 3.2-1**
**Elko NWS Meteorological Data Wind Rose, Elko County, Nevada**

**Table 3.2-3**
**Wind Direction Frequency Distribution,**
**Elko, Nevada, 2007 through 2011**[1]

| Wind Direction | Frequency (%) |
|---|---|
| N | 2.61 |
| NNE | 3.27 |
| NE | 7.06 |
| ENE | 14.12 |
| E | 9.47 |
| ESE | 2.92 |
| SE | 1.35 |
| SSE | 1.56 |
| S | 3.09 |
| SSW | 6.62 |
| SW | 13.65 |
| WSW | 12.43 |
| W | 8.25 |
| WNW | 3.99 |
| NW | 3.37 |
| NNW | 2.79 |

[1] NDEP, 2013a.

#### 3.2.1.1.2 Air Pollutant Concentrations

The EPA and states set limits on permissible concentrations of air pollutants. The National Ambient Air Quality Standards (NAAQS) and Nevada Ambient Air Quality Standards (Nevada AAQS) are health-based criteria for the maximum acceptable concentrations of air pollutants at all locations to which the public has access.

Monitoring of air pollutant concentrations has been conducted in the region. These monitoring sites are part of several monitoring networks overseen by state and federal agencies, including: NDEP-BAQP (Bureau of Air Quality Planning) Clean Air Status and Trends Network (CASTNET), Interagency Monitoring of Protected Visual Environments (IMPROVE), and National Acid Deposition Program (NADP) National Trends Network (NTN).

One Prevention of Significant Deterioration (PSD) Class I area is located within 200 kilometers (km), or 124.3 miles, of the Project Area. The Jarbidge Wilderness Area, designated PSD Class I, is located 43 km (26.7 miles) north-northwest of the Project Area, as shown on Map 3.2-1.

Air pollutants monitored in the region include carbon monoxide (CO), nitrogen dioxide ($NO_2$), ozone ($O_3$), particulate matter less than 10 microns in effective diameter ($PM_{10}$), particulate matter less than 2.5 microns in effective diameter ($PM_{2.5}$), and sulfur dioxide ($SO_2$). Background concentrations of these pollutants define ambient air concentrations in the region and establish existing compliance with ambient air quality standards. The most representative monitored regional background concentrations available for criteria pollutants as identified by NDEP are listed in Table 3.2-4 (NDEP, 2013b). Note that $NO_2$ and $SO_2$ are not reported because they are not monitored in Nevada by the NDEP.

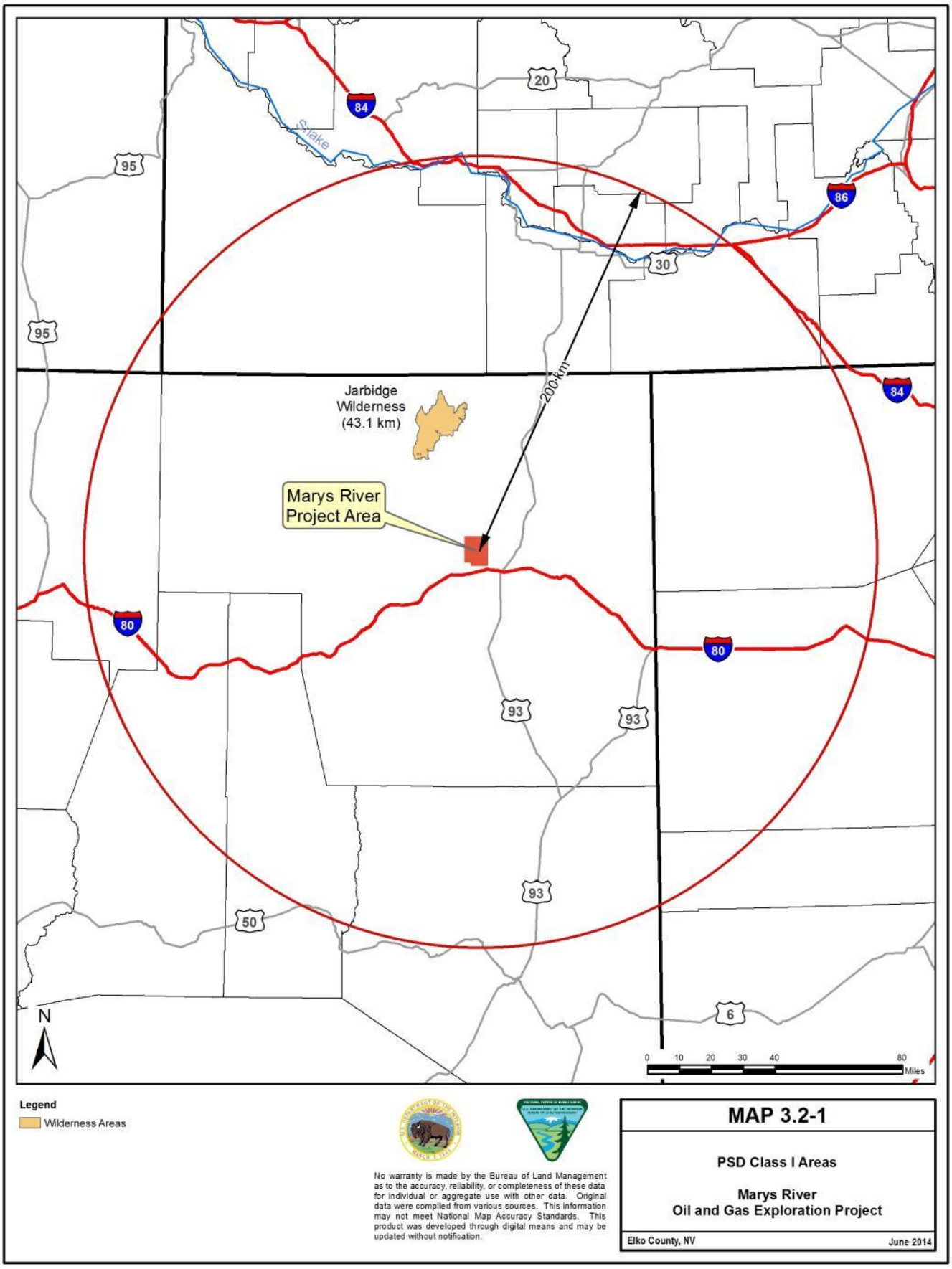

Snake
20
84
95
86
30
95
84
Jarbidge
Wilderness
(43.1 km)
200-km
Marys River
Project Area
80
80
93
93
93
50
6
N
0 10 20 30 40 80
Miles
Legend
Wilderness Areas
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
MAP 3.2-1
PSD Class I Areas
Marys River
Oil and Gas Exploration Project
Elko County, NV
June 2014

**Table 3.2-4**
**Background Ambient Air Quality Concentrations**
**(micrograms per cubic meter - µg/m$^3$)**

| Pollutant | Averaging Period | Measured Background Concentration |
|---|---|---|
| CO[1] | 1-hour | 6,670 |
| | 8-hour | 3,680 |
| $O_3$[2] | 8-hour | 137 |
| $PM_{10}$[3] | 24-hour | 124 |
| $PM_{2.5}$[4] | 24-hour | 15.2 |
| | Annual | 4.78 |

[1] Harvey's Resort Hotel, Stateline, Nevada. 2009-2011, NDEP, 2013b.
[2] Great Basin National Park. 2009-2011, NDEP, 2013b.
[3] Elko Grammar School #2, Elko, Nevada. 2011, NDEP, 2013b.
[4] Fernley Intermediate School, Fernley, Nevada. 2009-2011, NDEP, 2013b.

#### 3.2.1.1.3 Overview of Regulatory Environment

Federal air quality regulations adopted and enforced by NDEP-Bureau of Air Pollution Control (BAPC) limit incremental emission increases to specific levels defined by the classification of air quality in an area. The PSD Program is designed to limit the incremental increase of specific air pollutant concentrations above a legally defined baseline level. Incremental increases in PSD Class I areas are strictly limited, while increases allowed in Class II areas are less strict. Through the PSD program, Class I areas are protected by Federal Land Managers (FLMs) by management of air quality related values (AQRVs) such as visibility, aquatic ecosystems, flora, fauna, etc.

The 1977 Clean Air Act amendments established visibility as an AQRV that FLMs must consider. The 1990 Clean Air Act amendments contain a goal of improving visibility within PSD Class I areas. The Regional Haze Rule finalized in 1999 requires the states, in coordination with federal agencies and other interested parties, to develop and implement air quality protection plans to reduce the pollution that causes visibility impairment.

Regulations and standards which limit permissible levels of air pollutant concentrations and air emissions and are relevant to the Project air impact analysis include:

- NAAQS and Nevada AAQS;
- Prevention of Significant Deterioration;
- New Source Performance Standards; and
- Non-Road Engine Tier Standards.

Each of these regulations is further described in the following sections.

**Ambient Air Quality Standards**

The Clean Air Act requires the EPA to set NAAQS for pollutants considered to endanger public health and the environment. The NAAQS prescribe limits on ambient levels of these pollutants in order to protect public health, including the health of sensitive groups. The EPA has developed NAAQS for six criteria pollutants: $NO_2$, CO, $SO_2$, $PM_{10}$, $PM_{2.5}$, $O_3$, and lead. Lead emissions from Project sources are negligible (because leaded fuel is not used) and therefore, the lead NAAQS is not addressed in this analysis. States typically adopt the NAAQS but may also develop state-specific ambient air quality standards for certain pollutants. The NAAQS and the state ambient air quality standards for Nevada are summarized in Table 3.2-5. PSD Class I

and Class II increments are also included in Table 3.2-5 and a discussion of PSD increments follows below the table.

**Table 3.2-5**
**Ambient Air Quality Standards and PSD Increments (µg/m$^3$)**

| Pollutant/Averaging Time | NAAQS | Nevada AAQS | PSD Class I Increment[1] | PSD Class II Increment[2] |
|---|---|---|---|---|
| **CO** | | | | |
| 1-hour[2] | 40,000 | 40,000 | --[3] | --[3] |
| 8-hour (less than 5,000 ft. amsl)[2] | 10,000 | 10,000 | -- | -- |
| 8-hour (greater than 5,000 ft. amsl)[2] | 7,000 | -- | -- | -- |
| **$NO_2$** | | | | |
| 1-hour[8] | 188 | 188 | -- | -- |
| Annual[4] | 100 | 100 | 2.5 | 2.5 |
| **$O_3$** | | | | |
| 1-hour | --[5] | 235 | -- | -- |
| 8-hour[6] | 147 | 147 | --[3] | --[3] |
| **$PM_{10}$** | | | | |
| 24-hour[2] | 150 | 150 | 8 | 30 |
| Annual[4] | --[5] | 50 | 4 | 17 |
| **$PM_{2.5}$** | | | | |
| 24-hour[7] | 35 | 35 | 2 | 9 |
| Annual (Primary)[4] | 12 | 12 | 1 | 4 |
| Annual (Secondary)[4] | 15 | 15 | -- | -- |
| **$SO_2$** | | | | |
| 1-hour[9] | 196 | 196 | -- | -- |
| 3-hour[2] | 1,300 | 700 | 25 | 512 |
| 24-hour[2] | --[5] | 365 | 5 | 91 |
| Annual | --[5] | 80 | 2 | 20 |

[1] The PSD demonstrations serve information purposes only and do not constitute a regulatory PSD increment consumption analysis.
[2] No more than one exceedance per year.
[3] No PSD increments have been established for this pollutant.
[4] Annual arithmetic mean.
[5] The NAAQS for this averaging time for this pollutant has been revoked by EPA.
[6] An area is in compliance with the standard if the fourth-highest daily maximum 8-hour ozone concentrations in a year, averaged over 3 years, is less than or equal to the level of the standard.
[7] An area is in compliance with the standard if the highest 24-hour $PM_{2.5}$ concentrations in a year, averaged over 3 years, is less than or equal to the level of the standard.
[8] An area is in compliance with the standard if the 98$^{th}$ percentile of daily maximum 1-hour $NO_2$ concentrations in a year, averaged over 3 years, is less than or equal to the level of the standard.
[9] An area is in compliance with the standard if the 99$^{th}$ percentile of daily maximum 1-hour $SO_2$ concentrations in a year, averaged over 3 years, is less than or equal to the level of the standard.

The Project Area is treated as an area “in attainment” with ambient air quality standards. Therefore, new sources within this basin must evaluate their impacts to air quality with respect to the ambient standards. The major source of fugitive dust in the vicinity of the Project Area includes vehicular traffic on unpaved roads and windblown dust.

NDEP air quality basins for which attainment status is defined are generally the same as the Hydrographic Basins. The Project Area is located within the Marys River Area and the Star Valley Area. These areas are designated by the EPA as “unclassified” per NAAQS as set forth

in 40 CFR 81.329. An unclassified area is one for which no ambient air quality data are available and the ambient concentrations could be above or below the ambient air quality standards; however, unclassified areas are managed as in attainment. Generally, the ambient air quality over much of the valley is good, due to the limited population and absence of major industrial activity. The Project Area is classified as Class II, pursuant to the PSD regulations promulgated under the Clean Air Act.

**Hazardous Air Pollutants**

Toxic air pollutants, also known as hazardous air pollutants (HAPs), are pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. No ambient air quality standards exist for HAPs; instead emissions of these pollutants are regulated by a variety of regulations that target the specific source class and industrial sectors for stationary, mobile, and product use/formulations.

**Prevention of Significant Deterioration**

The PSD Program is designed to limit the incremental increase of specific air pollutant concentrations above a legally defined baseline level. All areas of the country are assigned a classification which describes the degree of degradation to the existing air quality that is allowed to occur within the area under the PSD permitting rules. PSD Class I areas are areas of special national or regional natural, scenic, recreational, or historic value, and very little degradation in air quality is allowed by strictly limiting industrial growth. PSD Class II areas allow for reasonable industrial/economic expansion. Certain national parks and wilderness areas are designated as PSD Class I, and air quality in these areas is protected by allowing only slight incremental increases in pollutant concentrations. There is one PSD Class I area within 200 km (124.3 miles) of the Project Area, as shown on Map 3.2-1. All other areas not designated PSD Class I are classified as PSD Class II, where less stringent limits on increases in pollutant concentrations apply.

Comparisons of Project impacts to the PSD Class I and II increments are for informational purposes only and are intended to evaluate a threshold of concern. They do not represent a regulatory PSD Increment Consumption Analysis, which would be completed as necessary during the New Source Review permitting process by the State of Nevada.

In addition to the PSD increments, Class I areas are protected by FLMs through management of AQRVs such as visibility, aquatic ecosystems, flora, fauna, etc. Evaluations of potential impacts to AQRVs would also be performed during the New Source Review permitting process under the direction of the NDEP-BAPC in consultation with the FLMs.

The AQRV of visibility has been identified as a concern at the Class I area in the region. Visibility conditions can be measured as standard visual range (SVR). SVR is the farthest distance at which an observer can just see a black object viewed against the horizon sky; the larger the SVR, the cleaner the air. Visibility for the region is considered to be very good. Continuous visibility-related optical background data have been collected in the PSD Class I Jarbidge Wilderness Area, as part of the IMPROVE program. The average SVR at the Jarbidge Wilderness Area has improved nearly 20 percent since 1992, and over the past 10 years has been greater than 200 km or 124.3 miles (Visibility Information Exchange Web System – VIEWS, 2013).

**New Source Performance Standards**

Under Section 111 of the Clean Air Act, the EPA has promulgated technology-based emissions standards which apply to specific categories of stationary sources. These standards are referred

to as New Source Performance Standards; 40 CFR Part 60. New Source Performance Standards which may apply to the Proposed Action include 40 CFR Part 60 Subpart A – General Provisions, 40 CFR Part 60 Subpart Kb – Standards of Performance for Volatile Organic Storage Vessels, or other applicable subparts.

**Non-Road Engine Tier Standards**

The EPA sets emissions standards for non-road diesel engines for hydrocarbons, $NO_X$, CO, and particulate matter. The emissions standards are implemented in tiers by year, with different standards and start years for various engine power ratings. The new standards do not apply to existing non-road equipment. Only equipment built after the start date for an engine category (1999-2006, depending on the category) is affected by the rule. Over the life of a Project, the fleet of non-road equipment would turn over and higher-emitting engines would be replaced with lower-emitting engines.

**Greenhouse Gases**

The U.S. Supreme Court ruled in 2007 that the EPA has the authority to regulate greenhouse gases (GHGs) such as methane and carbon dioxide ($CO_2$) as air pollutants under the Clean Air Act; however, no ambient air quality standards for GHGs currently exist, nor are there currently any emissions limits on GHGs that would apply to sources developed under the Proposed Action. Both the Construction/Drilling and Production/Operations phases of the Proposed Action would cause emissions of GHGs. Methane comprises much of the chemical composition of natural gas, and nitrous oxide, $CO_2$, and methane are emitted during combustion of fossil fuels. As part of the development of the Proposed Action emission inventory, an inventory of nitrous oxide, $CO_2$, and methane was prepared for informational purposes.

### 3.2.1.2 Environmental Consequences

#### 3.2.1.2.1 Proposed Action Alternative

The Proposed Action would produce emissions of air pollutants from stationary and mobile sources. Air pollutant emissions have the potential to increase air quality concentrations and affect public health in the vicinity of the Project Area. An inventory of air emissions was prepared to estimate total air pollutant emissions expected to result from Project construction and operations.

The majority of $PM_{10}$ and $PM_{2.5}$ emissions in the Project Area are attributed to fugitive dust sources, defined as those not able to be captured and routed to a control device. These fugitive sources include construction activities, equipment, and vehicles traveling on unpaved roads, and windblown disturbance.

Emissions of the criteria pollutants $NO_x$, CO, and volatile organic compounds (VOCs) occur primarily from fuel combustion sources including engines, heaters, heavy equipment, and mobile sources (heavy and light-duty vehicles) operating during the Construction/Drilling and Production/Operations phases of the Proposed Action. VOC emissions are also produced from oil and water tanks that would be located at each well pad.

Small quantities of HAP emissions would also occur from well completion and fuel combustion (flaring, engine use).

**Impact Significance Criteria**

Air quality impacts from pollutant emissions are limited by regulations, standards, and implementation plans established under the Clean Air Act, as administered by the NDEP-BAPC under authorization of the EPA. Under FLPMA and the Clean Air Act, the BLM cannot conduct or authorize any activity which does not conform to all applicable local, state, tribal or federal air

quality laws, statutes, regulations, standards, or implementation plans. As such, significant impacts to air quality from Project-related activities would result if it is demonstrated that:

- NAAQS or Nevada AAQS would be exceeded; or
- AQRVs would be impacted beyond acceptable levels.

All NEPA analysis comparisons to the PSD Class I and II increments are intended to evaluate a threshold of concern, and do not represent a regulatory PSD Increment Consumption Analysis. The determination of PSD increment consumption is an air quality regulatory agency responsibility. Such an analysis would be conducted to determine minor source increment consumption or, for major sources, as part of the New Source Review process. The New Source Review process would also include an evaluation of potential impacts to AQRVs such as visibility, aquatic ecosystems, flora, fauna, etc. performed under the direction of federal land managers.

**Emission Inventory Development**

Construction emissions sources include vehicle traffic, well pad and road construction, well drilling, and well completion. The primary pollutants emitted during construction would be $PM_{10}$, $PM_{2.5}$, $NO_x$, CO, $SO_2$, and VOCs. Construction would temporarily elevate pollutant levels, but impacts would be localized and would occur only for the short-term duration of construction at each well pad. Fugitive dust emissions ($PM_{10}$ and $PM_{2.5}$) during the construction phase would result from work crews traveling to and from the Project Area and from the transport and operation of equipment. Wind-blown fugitive dust emissions would also occur from open and disturbed land during construction.

During the operations phase, air emissions would occur from vehicle traffic on roads during routine field operations and maintenance, wind erosion of unreclaimed acres, and equipment at each well pad including oil and water tanks, a diesel generator, pump engine, line heater, and flare. The primary pollutants emitted would be $PM_{10}$, $PM_{2.5}$, $NO_x$, CO, $SO_2$, and VOCs.

**Particulate Matter (PM).** Emissions of particulate matter (dust) would occur due to movement of soils during construction and also from the earth moving machinery such as bulldozers, loader, and compactors. Additional sources of dust are wind erosion and vehicle traffic on dirt roads.

Mitigation measures for dust control include graveling road surfaces, speed control, and applying dust suppression agents such as water or chemical binding agents. The use of water trucks would focus on the areas of main travel and activity.

The NDEP-BAPC regulates particulate matter emissions from construction projects disturbing areas greater than 5 acres. A Surface Area Disturbance (SAD) application would be submitted for approval to the NDEP-BAPC. The SAD permit application would include a dust control plan as well.

**Sulfur Oxides ($SO_X$).** Sulfur oxides are produced by the combustion of sulfur in a fuel source. This would include heavy equipment and other vehicles using diesel as fuel. Low sulfur diesel, which has a lower sulfur content than historical formulations, would be used. The emissions of $SO_X$ from heavy construction equipment were calculated using EPA's AP-42 emission factors for mobile sources. The factors use a conservative fuel sulfur content compared to available diesel fuel used presently (500 parts per million - ppm or 15 ppm for ultra-low sulfur fuels). Sulfur is not expected to be encountered in the field gas produced from the well. If it is determined that the produced gas contains sulfur, the impacts would be analyzed and communicated to the BLM office.

**Nitrogen Oxides ($NO_X$) and Carbon Monoxide (CO).** $NO_X$ and CO are products of incomplete combustion. Sources of combustion from the Proposed Action include internal combustion engines and natural gas flaring. Several different types of equipment using engines would be used, including work trucks, construction equipment (bulldozers, scrapers, etc.), drilling rigs, electrical generators, equipment hauling vehicles, and produced oil and water transportation trucks. Many newer gasoline and diesel engines used in on-road vehicles incorporate catalytic converters to reduce emissions of $NO_X$ and CO. Off-road diesel engines used on drilling rigs should conform to EPA standards for emissions (Tier 1 through Tier 4) depending on their year of manufacture. Drilling rig engines were estimated using Tier 2 voluntary standards. However, newer, cleaner diesel engines would be used if available at the time of rig scheduling.

**Volatile Organic Compounds (VOC).** Emissions of VOCs are produced when hydrocarbons vaporize into the atmosphere. This can be done in several different ways such as incomplete combustion of hydrocarbons and direct venting of gas. Direct venting of gas could take place during well completion when fluids are allowed to return to the surface along with gas that may not be of high enough heating value to burn in a flare. Direct venting can also occur when hydrocarbons are stored in tanks. As the hydrocarbon liquid enters the tank it displaces the same volume of vapors from the tank. In addition, heating by direct sunlight vaporizes a small portion of the hydrocarbon which will then vent from the tank. Both streams of vapors, from well completion and tank venting, would be controlled using a combustion device. These combustion devices may be enclosed to reduce the amount of light observed or open flame, depending on the amount of gas to be controlled. The recently signed (not finalized) federal New Source Performance Standards for Oil and Gas is intended to reduce emissions of VOCs from these types of sources. While combustion of gas is a proven method to reduce VOC emissions, it only results in destruction efficiencies of around 95 percent to 98 percent.

**Hazardous Air Pollutants (HAPs).** HAPs are released to the atmosphere during the Construction/Drilling phase, primarily from fossil fuel combustion in drilling and completion engines and pumps utilized during well completion. During the Production/Operations phase, generators, pumps, heaters, and flares emit HAPs. On- and off-road mobile sources were considered negligible sources of HAPs. Total HAP emissions were calculated for 1) an annual maximum development scenario (16 wells constructed, 16 wells drilled, 16 annual completions, 16 water wells, and 4 wells in production) and 2) a maximum field-wide annual production scenario (20 wells operating). Construction/Drilling Phase emissions of the HAPs benzene, toluene, ethylbenzene, xylene, and n-hexane were found to be equal to or less than 0.13 tons per year each, and formaldehyde emissions totaled 2.19 tons per year. Field-wide HAP emissions during the Production/Operations phase were estimated at equal to or less than 0,28 tons per year for benzene, toluene, ethylbenzene, xylene, and n-hexane, and formaldehyde emissions were estimated at 10.58 tons per year. These field-wide formaldehyde emissions are attributable to combustion sources operating during production, and reflect a total of 0.53 tons per year emitted from each well site.

Pollutant emissions from the Construction/Drilling Phase were quantified using accepted methodologies, including EPA emission factors and engineering estimates. Drill rig and completion engines are assumed to be compliant with EPA Tier 2 emissions standards. Pollutant emissions from construction of a single well pad and well are shown in Table 3.2-6. Maximum annual field-wide emissions during the Construction/Drilling Phase are shown in Table 3.2-7, and assume that a maximum of 16 well pads are constructed, drilled, and completed in one year.

**Table 3.2-6**
**Emissions (1 Well and Pad) during the Construction/Drilling Phase**

| Activity | Tons Per Year | | | | | |
|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_X$ | CO | $SO_2$ | VOC |
| Well Pad and Road Construction | 2.67 | 0.29 | 0.34 | 0.17 | 0.03 | 0.04 |
| Rig-Up and Drilling | 1.29 | 0.21 | 3.20 | 3.43 | 0.00 | 0.39 |
| Completion | 5.06 | 0.51 | 0.35 | 0.49 | 0.00 | 0.12 |
| Water Well and Misc. Traffic | 0.16 | 0.02 | 0.01 | 0.01 | 0.00 | 0.001 |
| **Maximum Annual Emissions** | **9.18** | **1.03** | **3.90** | **4.10** | **0.03** | **0.55** |

**Table 3.2-7**
**Emissions (16 Wells and Pads) during the Construction/Drilling Phase**

| Activity | Tons Per Year | | | | | |
|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_X$ | CO | $SO_2$ | VOC |
| Well Pad and Road Construction | 0.10 | 0.09 | 0.27 | 0.08 | 0.03 | 0.03 |
| Rig-Up and Drilling | 1.29 | 0.21 | 3.20 | 3.43 | 0.00 | 0.39 |
| Completion | 5.06 | 0.51 | 0.38 | 0.68 | 0.00 | 0.23 |
| Water Well and Misc. Traffic | 1.49 | 0.15 | 0.10 | 0.11 | 0.00 | 0.01 |
| **Maximum Annual Emissions** | **7.94** | **0.96** | **3.95** | **4.30** | **0.03** | **0.66** |

Maximum annual emissions calculated for the Production/Operations Phase for one well are summarized in Table 3.2-8. Table 3.2-9 summarizes maximum annual emissions for the field in full production during the Production/Operations Phase, with 20 wells operating simultaneously.

**Table 3.2-8**
**Annual Emissions (One Well) during Production/Operations Phase**

| Activity | Tons Per Year | | | | | |
|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_X$ | CO | $SO_2$ | VOC |
| Oil Tanks | -- | -- | -- | -- | -- | 10.41 |
| Water Tanks | -- | -- | -- | -- | -- | 0.01 |
| Diesel Generator | -- | -- | 0.72 | 0.63 | -- | 0.24 |
| Pumping Unit | -- | -- | 0.48 | 0.96 | -- | 0.24 |
| Line Heater | -- | -- | 0.73 | 0.61 | -- | 0.04 |
| Flare | -- | -- | 3.60 | 3.02 | -- | 0.20 |
| Truck Loading | -- | -- | -- | -- | -- | 2.58 |
| Production Traffic | 3.93 | 0.39 | 0.07 | 0.05 | 0.0001 | 0.01 |
| Wind Erosion | 0.10 | 0.01 | -- | -- | -- | -- |
| **Total Production Emissions** | **4.03** | **0.40** | **5.60** | **5.27** | **0.00** | **13.73** |

**Table 3.2-9**
**Annual Emissions (20 Wells) during Production/Operations Phase**

| Activity | Tons Per Year | | | | | |
|---|---|---|---|---|---|---|
| | $PM_{10}$ | $PM_{2.5}$ | $NO_X$ | CO | $SO_2$ | VOC |
| Oil Tanks | -- | -- | -- | -- | -- | 208.23 |
| Water Tanks | -- | -- | -- | -- | -- | 0.25 |
| Diesel Generator | -- | -- | 14.47 | 12.54 | -- | 4.82 |
| Pumping Unit | -- | -- | 9.65 | 19.30 | -- | 4.82 |
| Line Heater | -- | -- | 14.52 | 12.20 | -- | 0.80 |
| Flare | -- | -- | 71.99 | 60.47 | -- | 3.96 |
| Truck Loading | -- | -- | -- | -- | -- | 51.61 |
| Production Traffic | 78.56 | 7.86 | 1.31 | 1.03 | -- | 0.12 |
| Wind Erosion | 2.09 | 0.21 | -- | -- | -- | -- |
| **Total Production Emissions** | **80.65** | **8.07** | **111.94** | **105.54** | **0.00** | **274.61** |

**Greenhouse Gases.** As part of the development of the Project emission inventory, an inventory of $CO_2$, $CH_4$, and $N_2O$ emissions from construction and operations was prepared. The GHG inventory is presented here for informational purposes and is compared to other state and U.S. GHG emission inventories in order to provide context for the Project GHG emissions.

Emissions of these greenhouse gases are quantified in terms of $CO_2$ equivalents ($CO_2e$). Measuring emissions in terms of $CO_2e$ allows for the comparison of emissions from different greenhouse gases based on their Global Warming Potential (GWP). GWP is defined as the cumulative radiative forcing of a gas over a specified time horizon relative to a reference gas resulting from the emission of a unit mass of gas. The reference gas is taken to be $CO_2$. The $CO_2e$ emissions for a greenhouse gas are derived by multiplying the emissions of the gas by the associated GWP. The GWPs for the inventoried greenhouse gases are $CO_2$:1, $CH_4$:21, $N_2O$:310 (EPA, 2010). Greenhouse gas emissions for Construction/Drilling and Production/Operations are shown in Table 3.2-10.

**Table 3.2-10**
**Project GHG Emissions (metric tons per year)**

| Pollutant | Construction/Drilling[1] | Production/Operations[2] |
|---|---|---|
| $CO_2$ | 47,247 | 55,407 |
| $CH_4$ | 1.05 | 4.39 |
| $N_2O$ | 0.17 | 0.22 |
| $CO_2e$ | 47,322 | 55,569 |

[1] Assumes 16 wells pads constructed and 4 producing wells.
[2] Assumes 20 wells in production.

By comparison, annual $CO_2e$ emissions from the State of Nevada totaled 56,000,000 metric tons per year in 2005, and annual $CO_2e$ emissions in the U.S. totaled 6,957,000,000 metric tons per year. Estimated $CO_2e$ emissions from the Proposed Action shown in Table 3.2-10 comprise approximately 0.18 percent of total Nevada $CO_2e$ emissions, and 0.0015 percent of U.S. $CO_2e$ emissions.

## Air Quality Impacts

**Criteria Pollutant Impacts.** Ambient air quality impacts associated with emissions during the Construction/Drilling Phase would be temporary in nature, persisting only during the short-term construction/drilling period at each well pad and at separate and distinct locations during field-wide construction. Ambient air quality impacts would be localized within the area immediately surrounding the fugitive or point emissions source, with concentrations reducing substantially

with distance from the source. This is particularly evident for fugitive emissions sources, the primary sources of $PM_{10}$ and $PM_{2.5}$ in the field. Furthermore, the relatively low single-well $NO_X$ emission rate shown in Table 3.2-6 indicates that a drilling rig would demonstrate compliance with the 1-hour $NO_2$ NAAQS and Nevada AAQS.

Total well site emissions from 20 wells during the Production/Operations Phase would be spatially separated, minimizing combined ambient air quality impacts from all wells. Both individual well emission rates and field-wide emission rates of $NO_X$ and $PM_{10}$, the primary pollutants emitted, are at levels generally able to comply with ambient standards. As a result, production phase operations would be expected to comply with NAAQS and Nevada AAQS.

Single-well emission rates are below the NDEP-BAPC modeling threshold of 25 tons per year (tpy) for any regulated pollutant, above which a facility must demonstrate ambient compliance through modeling. This threshold applies to a single facility, which in the context of the Proposed Action is defined as a single well site. Note that the threshold is established as a guideline; NDEP-BAPC can request modeling for any facility regardless of emission levels, and would determine that need during the New Source Review permitting process.

Table 3.2-11 compares the Proposed Action's field-wide production emissions with the state of Nevada's total emissions and Elko County emissions in 2005. Based on this comparison, Project-related emissions would add 0.04 percent to total state $NO_X$ emissions and 1.7 percent to total county $NO_X$ emissions, further suggesting the Proposed Action would not be significant on a state and county basis.

**Table 3.2-11**
**Project Emissions Comparison – Production/Operations Phase**

| Pollutant | Project Annual Field-Wide Production (tpy) | Nevada Total Emissions 2005 (tpy) | Elko County Total Emissions 2005 (tpy) |
|---|---|---|---|
| $NO_X$ | 111.9 | 255,553 | 6,452 |
| CO | 105.5 | Not reported | Not reported |
| VOC | 223.0 | 396,574 | 10,677 |
| $PM_{10}$ | 81.9 | Not reported | Not reported |
| $PM_{2.5}$ | 8.2 | 111,099 | 3,599 |
| $SO_X$ | 0.00 | 147,798 | 767 |

**Climate Change Impacts.** According to the BLM's IM No. 2008-171, "Guidance on Incorporating Climate Change into Planning and NEPA Documents," dated August 19, 2008, climate change considerations should be acknowledged in EA documents. The IM states that ongoing scientific research has identified the potential impacts on global climate of anthropogenic (man-made) GHG emissions and changes in biological carbon sequestration due to land management activities. Through complex interactions on a regional and global scale, these GHG emissions and net losses of biological carbon sinks cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia, recent industrialization and burning of fossil carbon sources have caused $CO_2e$ concentrations to increase dramatically, and are likely to contribute to overall global climatic changes. The Intergovernmental Panel on Climate Change recently concluded that "warming of the climate system is unequivocal" and "most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations."

Several activities contribute to the phenomena of climate change, including emissions of GHGs (especially $CO^2$ and $CH_4$) from fossil fuel development, large wildfires and activities using

combustion engines; changes to the natural carbon cycle; and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs could have a sustained climatic impact over different temporal scales. For example, recent emissions of $CO_2$ may influence climate for 100 years.

Current emissions within the vicinity of the Project Area include vehicle combustion emissions, fugitive dust from travel on unimproved roads, ranch activities, and wildland fires. Emissions of all pollutants are generally expected to be low due to the extremely limited number of sources in the vicinity of the Project Area. Existing climate prediction models are global in nature; therefore they are not at the appropriate scale to estimate potential impacts of climate change within the Marys River and Star Valley air basins in which the Project Area is located. Due to the nature and scale of the Proposed Action, effects on climate change are not further analyzed in this EA.

Because the EPA has recently finalized (not yet published in the Federal Register) a comprehensive set of regulatory controls on oil and gas facilities, many activities would be subject to a specific list of requirements per the Oil and Gas New Source Performance Standards, Subpart OOOO. In addition, the NDEP would require pre-construction operating permits for almost all well site equipment. Examples of these requirements include, but are not limited to the following:

- For atmospheric oil storage tanks at oil and gas exploration and production operations, VOC emissions of > 6 tpy are required to be reduced by 95 percent or greater.
- All continuous bleed pneumatic controllers placed in service on or after August 23, 2011 shall emit VOCs in an amount equal to or less than 6 standard cubic feet per hour.
- All condensate collection, storage, processing and handling operations, regardless of size, shall be designed, operated and maintained so as to minimize leakage of VOCs to the atmosphere to the maximum extent practicable.
- VOC combustion control devices shall be operated with no visible emissions greater than 5 minutes in any 2 hour period.
- Dust control and mitigation plans are required for SAD permits associated with projects disturbing over 5 acres.

Noble proposes to employ the following measures to mitigate potential impacts to air quality:

- Compliance with current oil and gas NESHAP Subpart OOOO, including 95 percent emission control on flowback venting, oil tanks, and water tanks.
- Tier II drill rig engines.
- Tier IV water pump engines.
- Ultra-low sulfur diesel used in diesel engines.
- Graveling road surfaces, speed control, and applying dust suppression agents such as water or chemical binding agents.
- Fugitive dust mitigation measures in accordance with NDEP-BAPC SAD permit for the Project.

In addition to the commitments discussed above, the applicant commits to complying with applicable air pollution control rules and regulations as outlined in Section 3.2.1.1.3.

**Mitigation Measures**

The BLM has identified the following measure to minimize impacts to air quality:

- Noble should obtain approval from the BLM for any method of dust control other than water.

#### 3.2.1.2.2 No Action Alternative

Under the No Action Alternative, there would be no impacts from either the Proposed Action Alternative or Visual Alternative to air quality or climate in the Project Area.

#### 3.2.1.2.3 Visual Alternative

Effects to air quality under the Visual Alternative would be the same as those discussed above under the Proposed Action Alternative.

### 3.2.1.3 Cumulative Effects

Air quality in the CESA is affected by natural conditions such as fire, blowing dust, and climatic variability along with a variety of anthropogenic effects such as blowing dust from soil disturbance, vehicle exhaust emissions, and emissions from industrial and domestic sources. These inputs have not been high enough to classify affected basins and as a result, air quality is generally considered to be good. There are no cumulative impacts of concern for the No Action Alternative because air quality in the basins is expected to continue to be good. The Proposed Action Alternative and Visual Alternative would incrementally increase pollutant emissions but these emissions are not expected to be substantial enough to require classification of the basins. As a result, there are no substantive cumulative effects to air quality for the Proposed Action and Alternatives.

## 3.2.2 GEOLOGY AND MINERALS

### 3.2.2.1 Current Conditions - Geology

The Humboldt River Basin is one of the most northeasterly of the Basin and Range downfaulted basins (U.S. Geological Survey - USGS, 1995). The basin is surrounded and underlain predominantly by Paleozoic marine sediments and filled with upper Tertiary and Quaternary fluvial, lacustrine, and alluvial sediments shed from the eroding ranges. All of the Tertiary and Quaternary basin-fill deposits are tuffaceous in nature to some extent (USGS, 2009). The stratigraphy and structure of the Project Area are comprised of and obscured by thick valley fill.

Solomon et al. (1979) have constructed a stratigraphic column of deposits in the Project Area from fragmentary outcrops and historic drilling results (see Figure 3.2-2). The Tertiary is divided into the Elko Formation, the Indian Well Formation, and the Humboldt Formation. This generalized section is complicated by Basin and Range extensional tectonism, which was accompanied by high-angle faulting and block rotation and was probably initiated in the Miocene and continues today.

Western Cordillera (2006a, b, and c) states the Humboldt Formation is Miocene in age, and consists primarily of volcanic ash and tuff, and siltstone, with conglomerate, sandstone and limestone common in the upper portion. Andesite and rhyolite flows and plugs occur throughout. Beds tend to be lenticular and no marker beds occur in the formation.

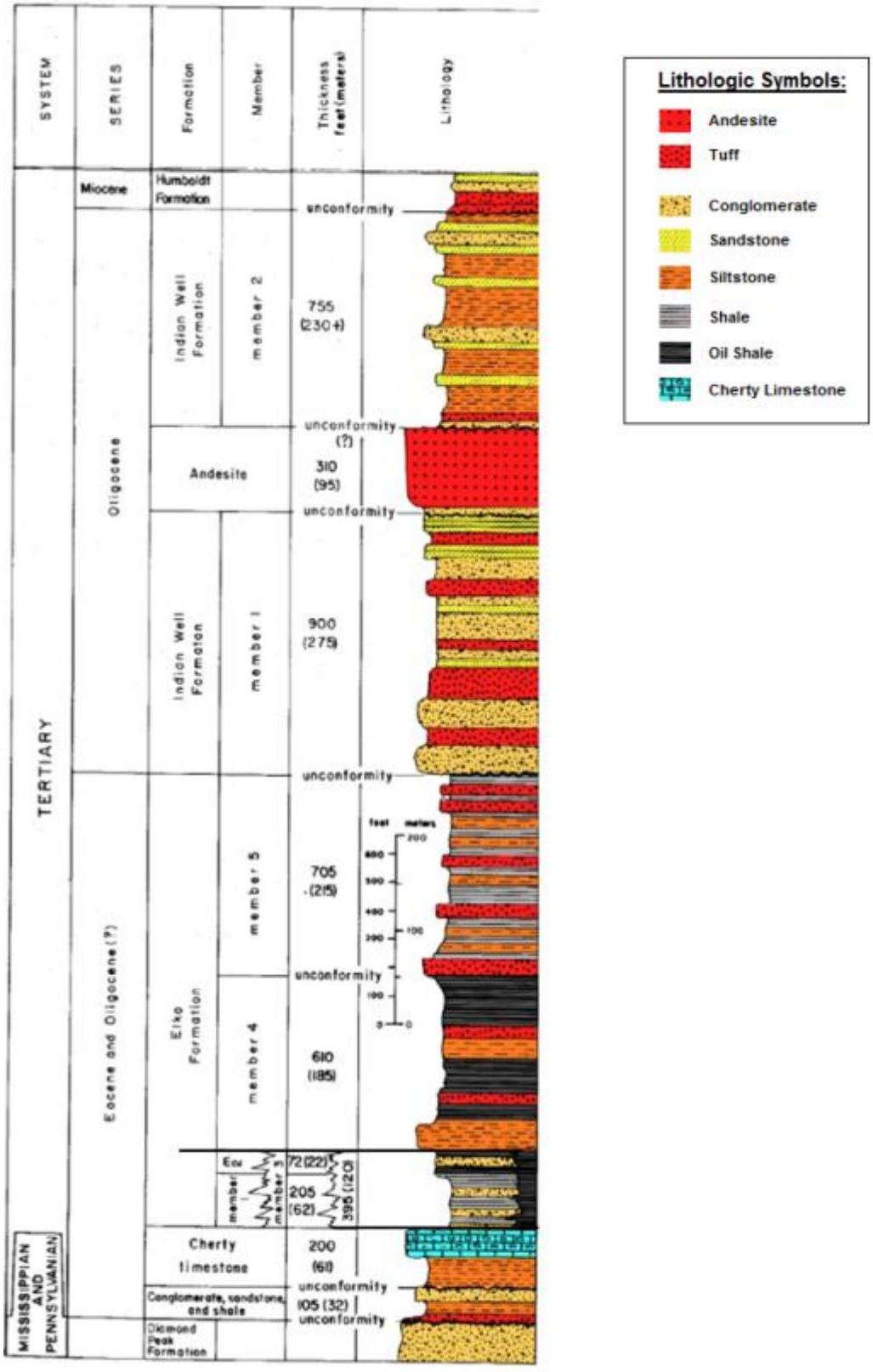



**Figure 3.2-2**
**Stratigraphic Column of the Tertiary in the Project Areas**
**(Solomon et al., 1979)**

The Indian Well Formation is described in Western Cordillera notes as Oligocene, and unconformably overlies the Elko Formation (Western Cordillera, 2006a, b, and c). It consists of tuff flows and fluvial conglomerate, siltstone-sandstone, andesite flows and lahars (debris flows). It also contains minor oolitic and algal limestone.

The Elko Formation is described in Western Cordillera notes as Late Eocene or Early Oligocene, and consisting of diverse and intertonguing lake sediments with minor volcanics (Western Cordillera, 2006a, b, and c). The Elko Formation in particular includes lake deposits, some of which are keroginous ("oil shale") with the potential to generate hydrocarbon fluids. From 1917 to 1924, the Catlin Shale Products Company at Elko produced about 12,000 barrels of shale oil from the Elko Formation (DOI, 1983).

**Seismology.** As is true for the entire Basin and Range Province (which is most of the state of Nevada), in which valleys are downthrown on marginal faults up to tens of thousands of feet with respect to intervening ranges, seismic activity is continual (and has been for ten million years and more) and heat flow is higher than the continental average. The crust is thinner, old and not-so-old intrusive rocks are shallow, and faults are deep. This means that kerogen-bearing rocks are "matured" (in terms of generation of hydrocarbon fluids) at shallower depth than in most basins, but also potential hydrocarbon reservoirs are more likely to be fragmented by faulting.

Six strong earthquakes (Magnitude 5-6) have occurred within the State of Nevada in a 56-year period, including the 2008 quake near Wells. Magnitude 6 is felt by everyone, in or outside; windows, books fall and dishes and glassware are broken; damage is slight to moderate to poorly designed buildings. The Advanced National Seismic System Comprehensive Earthquake Catalog database indicates 14,325 earthquakes over the past 50 years in Elko County (USGS, 2013a). Of these, 93 percent had a magnitude of 3.95 or less and 7 percent had a magnitude of 4.0-5.9. Only 19 quakes had a magnitude of 6.0-6.7, the most recent was in 2008.

#### 3.2.2.2 Current Conditions - Minerals

Oil and gas occurrences require 1) an initial hydrocarbon source; 2) subsequent maturation, or "cooking," of the source material; and 3) a reservoir to contain the product. In the Project Area, these elements are represented by, respectively: 1) lacustrine marlstone which consists of silt, mud, and clay with a substantial organic component; 2) burial of the marls to depths of over 7,000 feet, coupled with geothermal heat; and 3) permeable and porous basin-fill clastic material (sandstones and conglomerates) to serve as reservoirs.

An article in the Elko Daily Free Press (Harris, 2012) stated that the BLM has issued 438 oil and gas leases on more than 838,000 acres in the Elko District since 2006, most of which remain unexplored, and with little success to date. Grant Canyon Soil & Gas has a producing well south of Carlin, currently producing about 3,000 barrels (126,000 gallons) of oil per month, which peaked at 600,000 barrels (25.2 million gallons) in 1993. Advances in target definition and well completions have been substantial since that well was drilled. As stated above, oil shale has historically been extracted from the Elko Formation.

Other minerals are extracted in the area, most notably west of Elko, on the classic Carlin Gold Trend. The nearest mining activity to the Project Area is approximately 30 miles northeast where barite is currently being mined. Diatomite (lake deposits) and zeolites (in altered tuffs) have been mined in several locations on the edge of the Marys River Basin. No occurrences of these are known in the Marys River Basin. Numerous developed and undeveloped sources exist on and adjacent to the Project Area on both public and private lands for mineral materials such as sand and gravel.

#### 3.2.2.3 Environmental Consequences

##### 3.2.2.3.1 Proposed Action Alternative

Implementation of the Proposed Action could result in production of approximately 4.6 million barrels (193.2 million gallons) of oil over a 20-year period, if an economic resource is proven. The Project would not affect the extraction of other mineral resources in the area.

**Mitigation Measures**

The BLM has not identified any additional mitigation measures to reduce impacts to geology and minerals in the Project Area.

##### 3.2.2.3.2 No Action Alternative

Under the No Action Alternative, there would be no impacts to geology and minerals from either the Proposed Action Alternative or the Visual Alternative.

##### 3.2.2.3.3 Visual Alternative

Effects to geology and minerals under the Visual Alternative would be the same as those described above for the Proposed Action Alternative.

#### 3.2.2.4 Cumulative Effects

No other mineral extraction ventures are active in the CESA; consequently there would be no cumulative impacts resulting from either the Proposed Action Alternative or the Visual Alternative.

### 3.2.3 SOILS

#### 3.2.3.1 Current Conditions

The BLM has observed that overall soil quality within the Project Area is typical of soil quality that exists in this setting under current uses. The BLM observers state that soil quality is good and no major issues exist (Dean, 2012). Some areas of localized elevated impacts to soil quality exist from livestock grazing, vehicle use, wildland fire, and any activity which disturbs the ground surface but these impacts are not widespread and do not affect soil productivity at a large scale. Soil quality is also affected by natural conditions and occurrences such as wildland fire, climatic variability, weather events, climate change, and variability in soil forming factors.

Soils in the Project Area vary in depth, texture, erosion potential, and other characteristics based on several soil forming factors. To identify and describe the soil types and characteristics within the Project Area, the Soil Surveys of Elko County, Nevada, Central Part (Nevada 767), Northeast Part (Nevada 765), and Southeast Part (Nevada 766) were evaluated. Tabular and spatial data for these soil survey areas were downloaded from the Soil Survey Geographic Database (Natural Resource Conservation Service – NRCS, 2012a, 2012b, and 2012c). Soil properties and limiting features are summarized by map unit in Table 3.2-12 and are shown on Map 3.2-2. Soil map unit properties and limitations are for the dominant soil.

**Table 3.2-12**
**Soil Types and Limiting Characteristics in the Proposed Disturbance Area**

| Map Unit Name Map Symbol [1] | | Slope (%) | USDA Texture (surface horizon) [2] | Sensitive Soil Characteristics | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Soil Compaction Rutting Hazard [3] | Hydric Soil [4] | Water Erosion Potential [5] | Water Table [5] | Flooding [5] | Saline/ Sodic [6] | Prime Farmlands [7] | Local Roads and Streets Limitations [8] | Reclamation Sensitivity [12] |
| **Soils found on Fans, Fan Piedmonts, Fan Remnants, Fan Skirts, Hills [9]. Ecological Site: Loamy [10]** | | | | | | | | | | | | |
| Hunnton-Wieland association 093 | | 2-8 | silt loam/loam | Yes Low Strength | Inclusions | Slight | N/A | N/A | No | Yes Farmland of Statewide Importance | Yes Shrink-swell Low strength | Moderate. |
| Dacker-Nevador-Kelk association 160 | | 0-15 | silt loam/loam | Yes Low Strength | N/A | Slight/ Moderate | N/A | N/A | N/A | N/A | Yes Low Strength Depth to thick cemented pan Shrink-Swell | Moderate |
| Enko-Kelk-Enko, nearly level association 170 (b) | Soil Survey Area NV765 | 0-8 | Fine sandy loam/silt loam/ very fine sandy loam | Yes Low Strength | N/A | Slight | N/A | N/A | Yes | Yes – if irrigated and reclaimed of excess salts and sodium | Kelk Low strength shrink-swell | Moderate/ High |
| | Soil Survey Area NV767 | 0-8 | Fine sandy loam/ silt loam/ Very fine sandy loam | Yes Low Strength | N/A | Slight | N/A | N/A | Yes | N/A | Kelk Low Strength Shrink-swell | Moderate/ High |
| Enko-Kelk-Enko, very fine sandy loam association 221 | | 0-8 | Fine sandy loam/ silt loam/ very | Yes Low strength | N/A | Slight | N/A | N/A | Yes | N/A | Kelk Low Strength Shrink-swell Frost action | Moderate |

| Map Unit Name Map Symbol [1] | | Slope (%) | USDA Texture (surface horizon) [2] | Sensitive Soil Characteristics | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Soil Compaction Rutting Hazard [3] | Hydric Soil [4] | Water Erosion Potential [5] | Water Table [5] | Flooding [5] | Saline/ Sodic [6] | Prime Farmlands [7] | Local Roads and Streets Limitations [8] | Reclamation Sensitivity [12] |
| | | | fine sandy loam | | | | | | | | | |
| Bioya-Orovada association 232 | | 2-15 | Very fine sandy loam/fine sandy loam | Yes Low strength | N/A | Slight/ Moderate | N/A | N/A | Yes | Yes Farmland of Statewide Importance | N/A | Low/ Moderate |
| Chiara-Cherry Spring-Orovada association 370 | | 2-15 | Very fine sandy loam/silt loam/fine sandy loam | Yes Low strength Restrictive layer | N/A | Slight/ Moderate | N/A | N/A | No | N/A | N/A | Moderate / High |
| Hunnton-Wieland-Gance association 480/484 (c) | Soil Survey Area NV767 | 2-30 | Loam/very gravelly loam | Yes | N/A | Slight/ Moderate | N/A | N/A | No | Yes – Farmland of Statewide Importance | Shrink-swell Low strength Frost action Slope | Moderate |
| | Soil Survey Area NV765 | 2-30 | loam/ very gravelly loam | Yes Low Strength | N/A | Slight/ Moderate | N/A | N/A | No | N/A | Yes Flooding Low strength Shrink-swell Frost Action | Moderate |
| Oupico-Enko association 691 | | 2-8 | Loam | Yes Low Strength | N/A | Slight | N/A | N/A | No | Yes Farmland of Statewide Importance | N/A | Low/ Moderate |

| Map Unit Name Map Symbol [1] | | Slope (%) | USDA Texture (surface horizon) [2] | Sensitive Soil Characteristics | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Soil Compaction Rutting Hazard [3] | Hydric Soil [4] | Water Erosion Potential [5] | Water Table [5] | Flooding [5] | Saline/ Sodic [6] | Prime Farmlands [7] | Local Roads and Streets Limitations [8] | Reclamation Sensitivity [12] |
| Dacker-Yuko-Wieland association 516 (d) | Soil Survey Area NV765 | 2-30 | silt loam/ very gravelly loam/ loam | Yes Low Strength | N/A | Slight/ Moderate | N/A | N/A | Yes | N/A | Yes Flooding Low strength Shrink-swell Frost Action Depth to thick cemented pan | Moderate High |
| | Soil Survey Area NV767 | 0-15 | silt loam/very gravelly loam/loam | Yes Low strength | N/A | Slight/ Moderate | N/A | N/A | No | N/A | Low strength Shrink-swell Frost action Depth to cemented pan Depth to soft bedrock | Moderate |
| **Soils found on Floodplains [9]. Ecological Site: Loamy Bottom, Saline Bottom, Dry Floodplains [10]** | | | | | | | | | | | | |
| Sonoma-Devilsgait-Sonoma, strongly saline-Sodic association 180 | | 0-2 | Silt loam | Yes Low Strength | Inclusions | Slight | Devilsgait >4.0 feet (Feb. – July) Sonoma > 3.5 feet (Mar-June) | Very brief – Rare All Year (Sonoma) Long – Occasional (Mar. – June) Devilsgait | Yes | N/A | Yes Frost action Flooding Low Strength Shrink-swell | Low/ Moderate |
| Ocala-Kelk association 430 | | 0-2 | Silt loam | Yes Low Strength | Inclusions | Slight | Ocala >3.0 feet (Feb–Jun) | Long-Occasional (Mar. – June) (Ocala) Very brief – | Yes | N/A | Yes Flooding Low strength Shrink-swell | Moderate/ High |

| Map Unit Name Map Symbol [1] | Slope (%) | USDA Texture (surface horizon) [2] | Sensitive Soil Characteristics | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Soil Compaction Rutting Hazard [3] | Hydric Soil [4] | Water Erosion Potential [5] | Water Table [5] | Flooding [5] | Saline/ Sodic [6] | Prime Farmlands [7] | Local Roads and Streets Limitations [8] | Reclamation Sensitivity [12] |
| | | | | | | | Rare All Year (Welch & Kelk) | | | | |
| **Soils found on stream terraces and semi-bolsons [9]. Ecological Site: Sandy [10]** | | | | | | | | | | | |
| Connel extremely gravelly coarse sandy loam 740 | 0-2 | Extremely gravelly coarse loamy sand | N/A | N/A | Slight | N/A | N/A | No | N/A | N/A | Moderate |

[1] Alphabetic letters designations on soil mapping units which are the same between soil survey areas are corresponding to abutting mapping units across the survey boundary lines.

[2] USDA surface texture was obtained from *the Engineering Properties* table in the soil survey database.

[3] Disturbance acres were determined by GIS analysis. Road disturbance acres are based on a construction disturbance width of 31 feet for resource roads and 29 feet for local roads and include any existing roadway.

[4] Construction of Haul Roads and Soil Compaction/Rutting – sensitive soils include those with an NRCS rating of high or severe for the *Haul Roads, Log Landings, and Soil Rutting* category. Ratings are based on depth to a water table, rock fragments on or below the surface, the Unified classification, depth to a restrictive layer, and slope.

[5] Hydric Soils – at least one major named map unit soil is included on the county hydric soil list. A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.

[6] Water Erosion Potential obtained from selected soil interpretations – Potential for Erosion Hazard off-road/off Trail, flooding, and water table potential obtained from the *Water Features* table. Rating is for the dominant soil in the map unit.

[7] Saline/sodic – rating obtained from *Chemical Properties* table; when the conductivity is greater than 8 mmhos/cm or the SAR is greater than 12, or both. Rating is for the dominant soil in the map unit.

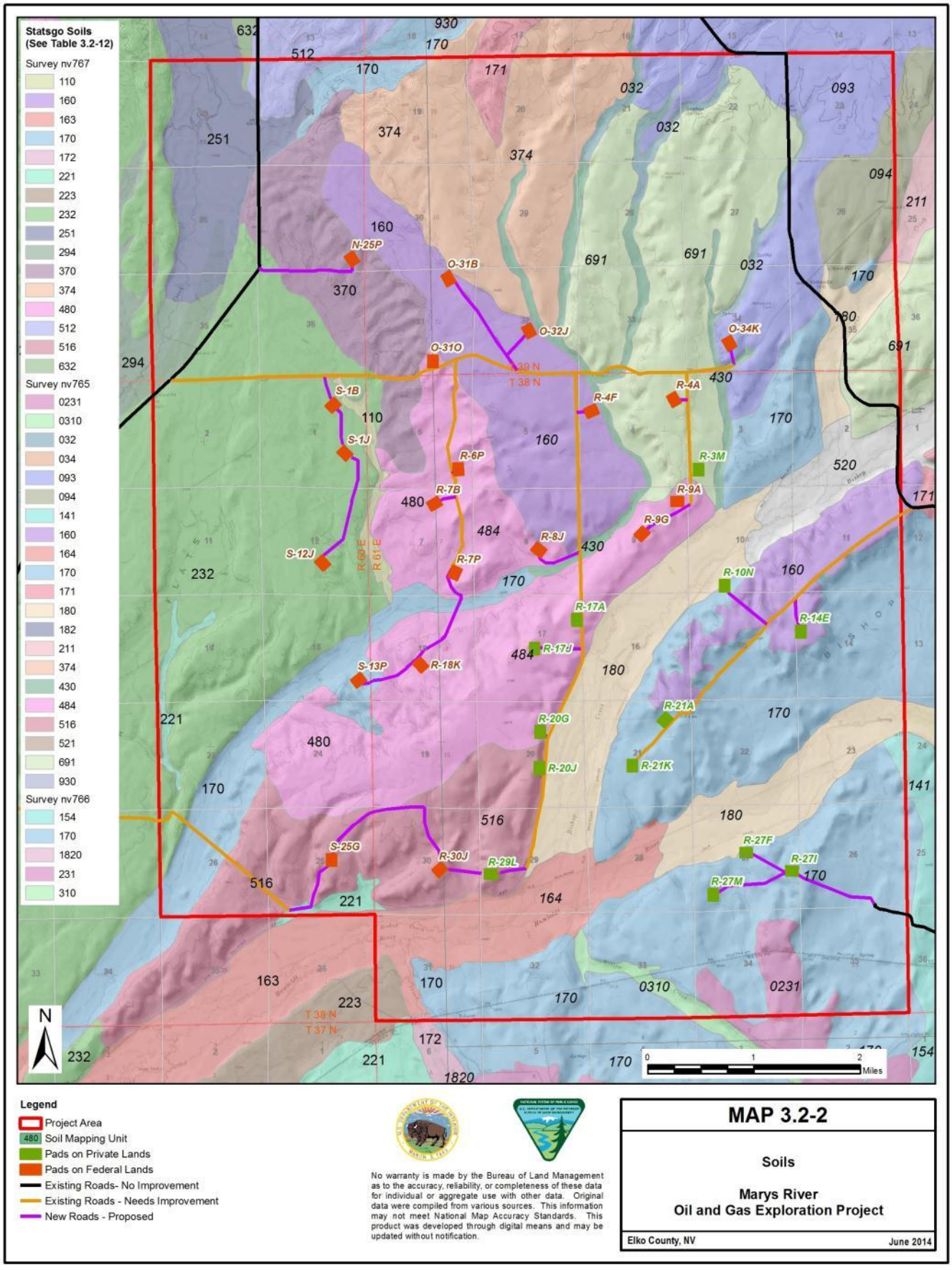
[8] Prime farmland rating taken from the *Prime farmland* list in the soil survey. Rating is for any of the major soils in the map unit.

[9] Local Roads and Streets and the Shallow Excavations ratings were obtained from the *Roads and Streets, Shallow Excavations, and Lawns and Landscaping* table in the soil survey. Rating is for the dominant soil in the map unit.

[10] Landscape position was obtained from the *Map Unit Description* and describes the typical setting for the dominant soil in the map unit.

[11] An "ecological site" is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff that has developed over time; and a characteristic plant community (kind and amount of vegetation). Ecological site was obtained from the *Map Unit Description*.

[12] Reclamation Sensitivity. Soils having reclamation sensitivity is a combined rating for soils with high or severe erosion potential, steep slopes, large stones, shallow soils, low available water content, and saline or sodic conditions and clayey soils (greater than 40 percent). Restoration of these soils in most cases requires adaptive seed mixtures and implementation of revegetation practices (i.e., scarification, fertilization, proper seeding techniques, mulching, monitoring, etc.) to enhance revegetation success.


Statsgo Soils
(See Table 3.2-12)
Survey nv767
110
160
163
170
172
221
223
232
251
294
370
374
480
512
516
632
Survey nv765
0231
0310
032
034
093
094
141
160
164
170
171
180
182
211
374
430
484
516
521
691
930
Survey nv766
154
170
1820
231
310
N-25P
O-31B
O-32J
O-31O
O-34K
S-1B
S-1J
S-12J
R-4F
R-4A
R-6P
R-7B
R-7P
R-8J
R-3M
R-9A
R-9G
R-10N
R-14E
R-17A
R-17J
S-13P
R-18K
R-20G
R-20J
R-21A
R-21K
S-25G
R-30J
R-29L
R-27F
R-27I
R-27M
T 39 N
T 38 N
T 37 N
R 60 E
R 61 E
N
0
1
2
Miles
Legend
Project Area
480 Soil Mapping Unit
Pads on Private Lands
Pads on Federal Lands
Existing Roads- No Improvement
Existing Roads - Needs Improvement
New Roads - Proposed
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
MAP 3.2-2
Soils
Marys River
Oil and Gas Exploration Project
Elko County, NV
June 2014

Fifteen soil mapping units occur in the area of potential disturbance within the Project Area. Four of these map units occur in two or more of the soil survey areas. Each of these mapping units is generally comprised of two or more soil series which are the major soils that make up the mapping unit. The majority of the soil mapping is mapped as soil "associations." An association is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. During mapping, it was not considered practical or necessary to map the soils separately and the pattern and relative proportion of the soils are similar. The dominant soil series that make up the mapping unit generally have similar characteristics and properties. Other minor soil components or inclusions that may have similar or contrasting characteristics also typically occur within the mapping units. Because of the map scale used during the soil surveys, these minor soil components are not mapped separately. The objective of soil mapping is to separate the landscape into landforms or landform segments that have similar use and management requirements.

The various soil mapping units in the Project Area can generally be grouped into two soil groups based on their landscape position. These two soil groups formed from alluvium (from mixed rocks) and developed on either floodplains, or alluvial fan remnants, skirts, insets or fan piedmonts.

**Soils on Fan Remnants, Skirts, Insets and Fan Pediments**

These alluvial soils developed on fan remnants, skirts, insets and fan pediments. These soils typically have slopes of 2 to 30 percent, are well-drained, and very deep (greater than 60 inches) to moderately deep (10 to 40 inches) over a restrictive layer (duripan). The available water capacity is high to low depending on the depth to the duripan. These soils generally do not have a seasonal water table and are not flooded. The ecological site of these soils is Loamy. Generally, the water erosion hazard of these soils is slight to moderate and the wind erosion hazard is slight. The water erosion hazard of the soils in this group typically increases with slope.

The Enko-Kelk-Enko, nearly level association (map unit symbol 170) occurs on fans and fan pediments and is listed as "Prime Farmland if irrigated and reclaimed of excess salts and sodium" in the Elko County, Nevada, Northeast Part (Nevada 765). Map unit 170 also occurs in the Elko County, Nevada, Central Part (Nevada 767) and Elko County, Nevada, Southeast Part (Nevada 766), but is not listed as "Prime Farmland" in either survey. None of the map unit 170 delineations appear to be under agricultural production based on examination of the most recent National Agricultural Imagery Photography – NAIP (2010).

Four soil map units are listed as "Farmland of statewide importance." These include: Hunnton-Wieland association (map unit symbol 93) and Oupico-Enko association (map unit symbol 691) in the Elko County, Nevada, Northeast Part (Nevada 765) soil survey; the Dacker-Nevador-Kelk association (map unit symbol 231) in Elko County, Nevada, Southeast Part (Nevada 766) soil survey; the Bioya-Orovada association (map unit symbol 232), and the Hunnton-Wieland-Gance association in Elko County, Nevada, Central Part (Nevada 767) soil survey.

**Soils on Floodplains**

These alluvial soils are on floodplains. These soils typically have slopes between 0 and 2 percent, are very deep (greater than 60 inches), poorly drained, and have a high available water content. A majority of these soils have a seasonal high water table and may be flooded in the early spring to early summer. Several of these alluvial soils are designated as hydric or have hydric soil inclusions within the mapping unit and some are saline and or sodic at the surface. The wind and water erosion hazard of the soils in this group is slight. The Ecological Site of these soils includes: Saline Bottom, Saline Meadow, Moist Floodplain, Dry Floodplain, and Loamy Bottom.

The characteristic vegetation of the soil mapping units that formed on the floodplains is more varied than the soils on fans and fan pediments and differs by the Ecological Site. The typical vegetation on the Saline Ecological Site is generally characterized by Basin wildrye, Black greasewood, and other saline tolerant species, such as Alkali sacaton, Alkali muhly, Alkali bluegrass, Bottlebrush squirreltail, and inland saltgrass. On other floodplain Ecological Sites, Basin wildrye is a dominant species, along with Beardless wildrye, Basin big sagebrush, Nevada bluegrasses, western wheatgrass, and thickspike wheatgrass.

Biological soil crusts (BSCs) are likely to be present within the Project Area; however, their extent and level of influence is likely small due to historic disturbance from vegetative seedings in much of the Project Area. In addition, the high vegetative cover throughout most of the Project Area precludes establishment of a biological soil crust. Crusts that are present increase soil cohesiveness and reduce the hazard of erosion by wind and water (Belnap, 2001).

### 3.2.3.2 Environmental Consequences

#### 3.2.3.2.1 Proposed Action Alternative

Under the Proposed Action, impacts to soils would occur during construction of new roads, upgrade of existing roads, and construction of well pads (see Map 3.2-2). A list of soils identified for potential disturbance for 33 well pads and associated access roads (381.8 acres) is provided in Table 3.2-13 by mapping unit; however, no more than 20 of the 33 identified well pads and associated access roads would be constructed resulting in an estimated disturbance of 276.5 acres (0.7 percent of the Project Area) in the short-term. Of this, 65.4 acres associated with temporary road disturbance and drilling pad disturbance would be reclaimed after construction and 211.1 acres (0.5 percent of the Project Area) would remain in the long-term.

All of the soils in the Project Area affected by the Proposed Action have a slight to moderate soil erosion potential (see Table 3.2-12). Soil erosion and sedimentation would be minimized by implementation of Noble's Stormwater Pollution Prevention Plan. Effects to soils by contamination would be minimized by implementation of the Spill Plan, which requires the immediate cleanup of any spills. Fueling would not occur within 400 feet of any streams, creeks, springs, or wetland areas.

Three soil map units contain inclusions of hydric soils. These hydric soil inclusions range from 1 to 5 percent of each map unit. On two of these mapping units seasonal water tables (within 5 feet of the surface) may be present for 5 to 6 months (February through June or July) during the year in the hydric soil areas. Surface flooding may occur periodically on these same mapping units throughout the year due to snowmelt or thunderstorms. Impacts on the hydric soil inclusions would occur during road construction, road upgrades, and well pad construction. Noble would minimize impacts on hydric soils by adjusting the site plan, whenever possible. Noble's Stormwater Pollution Prevention Plan would be implemented at all times to minimize impacts on the hydric soils.

**Table 3.2-13**
**Soils Potentially Impacted**

| Map Unit Name (Map Symbol[1]) | | Project Area (acres) [2] |
|---|---|---|
| **Soils found on Fans, Fan Piedmonts, Fan Remnants, Fan Skirts, Hills[3]**<br>**Ecological Site: Loamy[4]** | | |
| Hunnton-Wieland association (093) | | 7.4 |
| Dacker-Nevador-Kelk association (160) | | 59.7 |
| Enko-Kelk-Enko, nearly level association (170b) | Soil Survey Area NV765 | 55.3 |
| | Soil Survey Area NV767 | 9.9 |
| Enko-Kelk-Enko, very fine sandy loam association (221) | | 1.1 |
| Bioya-Orovada association (232) | | 47.8 |
| Chiara-Cherry Spring-Orovada association (370) | | 11.6 |
| Hunnton-Wieland-Gance association (480/484c) | Soil Survey Area NV767 | 18.2 |
| | Soil Survey Area NV765 | 86.5 |
| Oupico-Enko association (691) | | 24.2 |
| Dacker-Yuko-Wieland association (516d) | Soil Survey Area NV765 | 19.1 |
| | Soil Survey Area NV767 | 26.9 |
| **Soils found on Floodplains.[3]**<br>**Ecological Site: Loamy Bottom, Saline Bottom, Dry Floodplains[4]** | | |
| Sonoma-Devilsgait-Sonoma, strongly saline-Sodic association (180) | | 10.8 |
| Ocala-Kelk association (430) | | 2.7 |
| **Soils found on stream terraces and semi-bolsons[3]**<br>**Ecological Site: Sandy[4]** | | |
| Connel extremely gravelly coarse sandy loam (740) | | 0.6 |
| **Total** | | **381.80** |

[1] Alphabetic letter designations on soil mapping units which are the same between soil survey areas are corresponding to abutting mapping units across the survey boundary lines.

[2] Disturbance acres were determined by GIS analysis. Road disturbance acres are based on a construction disturbance width of 31 feet for resource roads and 29 feet for local roads and include any existing roadway.

[3] Landscape position was obtained from the *Map Unit Description* and describes the typical setting for the dominant soil in the map unit.

[4] An "ecological site" is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff that has developed over time; and a characteristic plant community (kind and amount of vegetation). Ecological site was obtained from the map unit description.

Road construction or upgrading of existing roads would impact soils during construction. As noted in Table 3.2-12 a majority of the soils affected by the Proposed Action have low strength and/or high shrink-swell potentials and are susceptible to rutting or compaction when wet. Soils with these properties require appropriate engineering/construction practices to overcome these limiting properties and to minimize road maintenance requirements. Engineering/construction practices that would be implemented to address these limiting soil properties would include road crowning, ditching, surfacing with gravel and designing to meet the Gold Book Standards (BLM and Forest Service, 2007) and the BLM Road Manual 9113 (BLM, 2011). Construction would be limited to periods when wet weather would not cause rutting.

Approximately 54 acres of soils identified for 33 well pads are designated as Prime Farmland Soils, if irrigated, and 94.9 acres of soils identified for 33 well pads are designated as Farmland of Statewide Importance (see Table 3.2-12). None of the soils in the Project Area are irrigated or farmed, and all soils are managed as rangelands. Therefore, no impact to Prime Farmland soils or Farmland of Statewide Importance would occur from the Proposed Action.

As noted in Table 3.2-12, the majority of the soils affected by the Proposed Action have a moderate Reclamation Sensitivity rating. These soils typically have a combination of limiting soil characteristics that could make disturbed area reclamation difficult if appropriate reclamation practices and seed mixtures are not implemented. The primary limiting soil characteristics include shallow soils, course soil textures (high gravels) content, low available water content, and saline or sodic conditions. Well pad and road construction have the potential to adversely affect natural soil characteristics and, consequently soil productivity and restoration potential. Potential soil impacts may include:

- soil erosion (water and wind) from loss vegetation cover during grading and through increase compaction;
- soil compaction and damage to soil structure resulting from;
    - the movement of heavy construction equipment;
    - rutting from equipment and vehicle traffic; or
    - soil mixing or displacement from grading activities.

Adverse soil impacts which alter natural soil conditions may affect soil productivity resulting in changes to vegetation communities and loss of vegetation growth. Impacts to soil productivity may occur both in the short- and long-term depending on the extent of the impact and the measures used to rectify the impacts. Soil quality would be poorer until all the soils are successfully reclaimed. Soils where there is temporary disturbance would be reclaimed much faster and soils with long-term disturbance would take longer to reach optimal soil quality. Even with successful reclamation, soils may not return to their original condition. Long-term effects would result from burying of drill cuttings and would result in a different long-term state due to mixing.

To enhance revegetation success on all temporarily disturbed areas, topsoil would be removed from all construction areas to a depth of 6 inches or as directed by the BLM. Topsoil would be placed in stockpiles that minimize wind or water erosion and seeded with a temporary seed mix to minimize topsoil loss. Topsoil would be replaced on temporarily disturbed areas to be restored to a depth of 6 inches after the area has been ripped to depth of 1 foot. Appropriate seed mixtures would be applied using drilling or broadcast methods during the acceptable seeding windows and using applicable seeding rates for the seeding method. Approximately 143 acres or 39 percent of soils identified for 33 well pads are considered saline or sodic (see Table 3.2-12) which can be difficult to revegetate. Seed mix development is discussed in the Marys River Reclamation Plan (Appendix G).

Road improvement and road and well pad construction would affect BSCs. This effect would decrease organism diversity in these areas, which could decrease soil nutrients, soil stability, and organic matter in the soil horizon. Crusts are well adapted to severe growing conditions but poorly adapted to compressional disturbances and/or removal. Once the construction is completed, it is expected that BSCs would eventually recolonize reclaimed areas over time. Full recovery of BSCs from extensive disturbance is a slow process, particularly for mosses and lichens. Recovery of pre-disturbance crust thickness can take up to 50 years, and mosses and lichens can take up to 250 years to recover. Noble would confine all Project-related vehicle traffic and construction activities to the approved roads and well pads in order to minimize impacts to the BSCs.

**Mitigation Measures**

The BLM has not identified mitigation measures to further reduce impacts to soils.

#### 3.2.3.2.2 No Action Alternative

Under the No Action Alternative, there would be no impacts from either the Proposed Action Alternative or the Visual Alternative to soils in the Project Area.

#### 3.2.3.2.3 Visual Alternative

Effects to soils under the Visual Alternative would be similar to those described above for the Proposed Action. Potential soil disturbance would be less, with the reduction almost all (52 acres) occurring in the Enko-Kelk-Enko (loamy), nearly level association. All other soil disturbances under the Visual Alternative are less than 2 acres as compared to the Proposed Action.

### 3.2.3.3 Cumulative Effects

Cumulative effects to soils within the CESA occur as a result of a variety of natural and man-made factors that include but are not limited to those stated throughout the EA. Although soils are generally negatively affected by these impacts, they have not resulted in any major or high intensity impacts to soil quality on a large spatial or temporal scale within the CESA. The cumulative effects would continue under the No Action Alternative. As described above, either the Proposed Action Alternative or the Visual Alternative could result in additional impacts to soil resources; however, with implementation of Project design features such as adherence to the Stormwater Pollution Prevention Plan and Spill Prevention Plan, cumulative effects to soils would not substantially increase.

## 3.2.4 HYDROLOGY

### 3.2.4.1 Current Conditions - Surface Water

The Project Area is located in the Upper Humboldt River Basin (USGS Hydrologic Unit Code - HUC 16040101 in the Great Basin Region and Nevada Division of Water Resources Hydrographic Area 042, Marys River, and 043, Starr Valley). This Sub-basin is drained by several major streams including the Humboldt River which runs through the Project Area, Marys River which is 5 miles west of the Project Area, and Lamoille Creek which is 20 miles southwest of the Project Area.

There are five perennial/intermittent streams within the Project Area and numerous unnamed ephemeral streams. The perennial/intermittent streams include the Humboldt River, Bishop Creek, Burnt Creek, Trout Creek, and Tabor Creek. These streams enter the Project Area from the northeast and all but Tabor Creek converge into the Humboldt River before exiting the Project Area to the southwest (see Map 3.2-3).

Hydrology within the Project Area is altered by agricultural diversions in the headwaters of Bishop Creek. The Bishop Creek Dam, located about 15 miles upstream of the Project Area, stores and diverts spring runoff for agricultural use in the Metropolis area. This diversion alters hydrologic processes associated with flooding which likely affects riparian vegetation and water quality within the Project Area. Remnants of abandoned diversion ditches occur in the floodplains of the Humboldt River and Bishop Creek in the Project Area. There are also abandoned railroad beds in both Humboldt and Bishop creeks affecting high water hydrology.

Streams in the Project Area are not routinely observed and measured by the BLM because they are primarily on private land, but enough is known about these waters to describe them in general terms. The streams have meandering channels with adjacent scrub willow and grasses. The streams flow in valleys that are incised into Humboldt Formation valley fill, and have formed broad floodplains (Figure 3.2-3). The floodplain of the Humboldt River in the west of the Project Area has cottonwoods along the banks and wetland depressions in former channels. The

highest flowing reach of stream in the Project Area is Bishop Creek, where it enters the eastern margin of the Project Area where it has been observed to flow at about 2 cubic feet per second (cfs) in late spring in a dry year. Flow in the stream has been observed to gradually decrease downstream where it combines with the Humboldt River near the west margin of the Project Area. The Humboldt River is said to be gaining west of Wells (USGS, 2009), but most if not all of this recharge probably occurs from springs near Wells and spring and streamflow from the East Humboldt range to the south of the Project Area. Likewise, Bishop and Tabor creeks receive their recharge from snowmelt runoff, and groundwater in adjacent ranges and flow across the Humboldt Formation without contact or recharge from the deep valley fill aquifer.

Streamflow in and near the Project Area supports the current conditions discussion of groundwater (Section 3.2.4.4), which asserts that there is little if any migration of groundwater from deep aquifers to shallow aquifers within the Project Area (Plume and Smith, 2013). If migration of water from the deep to shallow aquifer did occur, it would be reasonable to expect streamflows to increase in and near the Project Area. While there are only anecdotal data to suggest that streamflow decreases in the Project Area, empirical data from Marys River, which is approximately 5 miles away, can be extrapolated to describe processes in Project Area streams. The measureable flow in the Marys River at Deeth was less than 2 cfs in water years 1992 – 2007, and less than 0.01 cfs half that time, despite this relatively large catchment. The Marys River station data also show that flow is immeasurable 30 percent of the time, meaning it has no baseflow (groundwater component) to sustain summer-fall flow. While the Project is not in the Marys River catchment, it is nearby, and in similar lithology, and therefore this lack of baseflow or groundwater connection to surface water is also characteristic of hydrology in the Project Area.

Flow frequency data for upper tributaries in the Upper Humboldt Basin from USGS (2009) are shown on Figure 3.2-3.

The NDEP, Bureau of Water Quality Planning (BWQP), with oversight from the EPA, implements the Clean Water Act in Nevada. They have completed some analysis of water quality which applies to the Project Area. According to the current EPA-approved water quality assessment for Nevada, the beneficial uses for the Humboldt River are aquatic life, industrial supply, irrigation, municipal and domestic supply, propagation of wildlife, contact and non-contact recreation, and watering of livestock (NDEP, 2013c). As a tributary to the Humboldt River, the beneficial uses are the same for Bishop Creek.

The Clean Water Act requires states to compile a list of waterbodies, known as the 303(d) list, that do not fully support their designated uses. According to the 2008-2010 Water Quality Integrated Report and 303(d) list, the Humboldt River is listed as a Category 5 - non-attaining for aquatic life for the parameters iron and total phosphorus (NDEP, 2013d).

#### 3.2.4.2 Current Conditions - Floodplains

A 100-year floodplain is defined by the Federal Emergency Management Agency (FEMA) as the area adjacent to a watercourse that has a one percent chance of becoming wet in any single year (FEMA, 1992). A 100-year floodplain occurs along the bank of the Humboldt River and Bishop Creek within the Project Area (see Map 3.2-3).

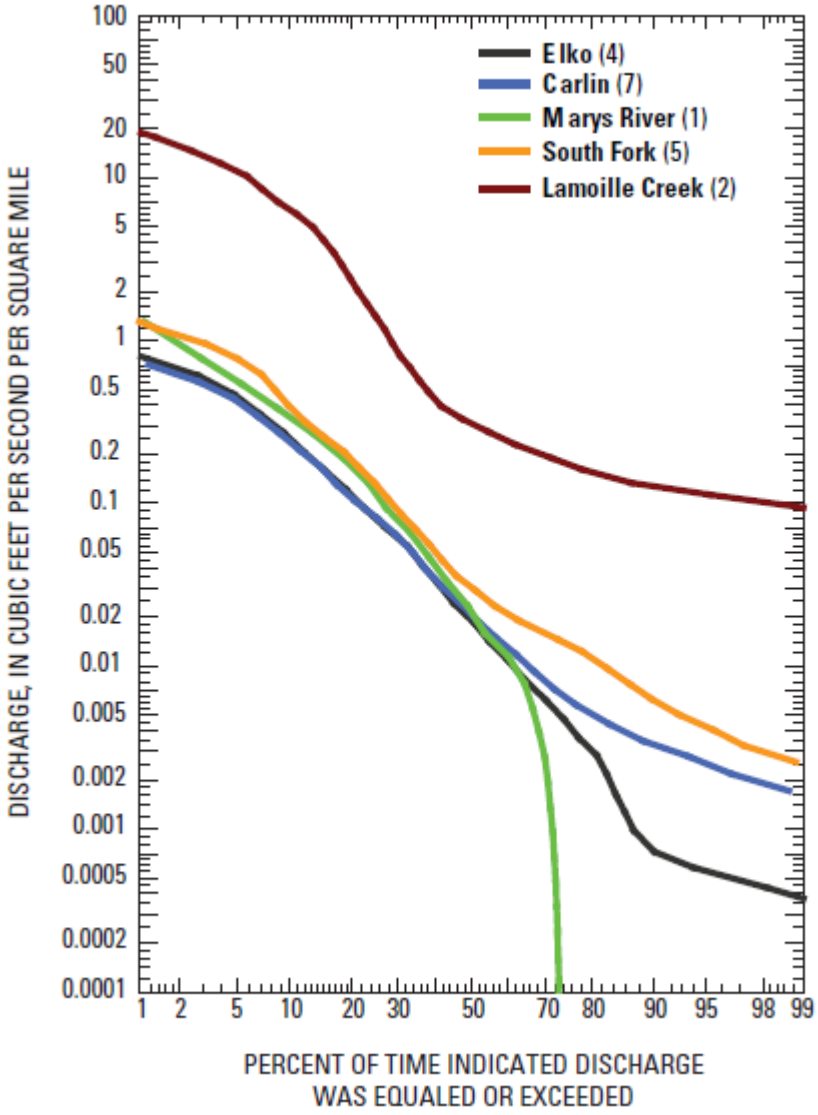
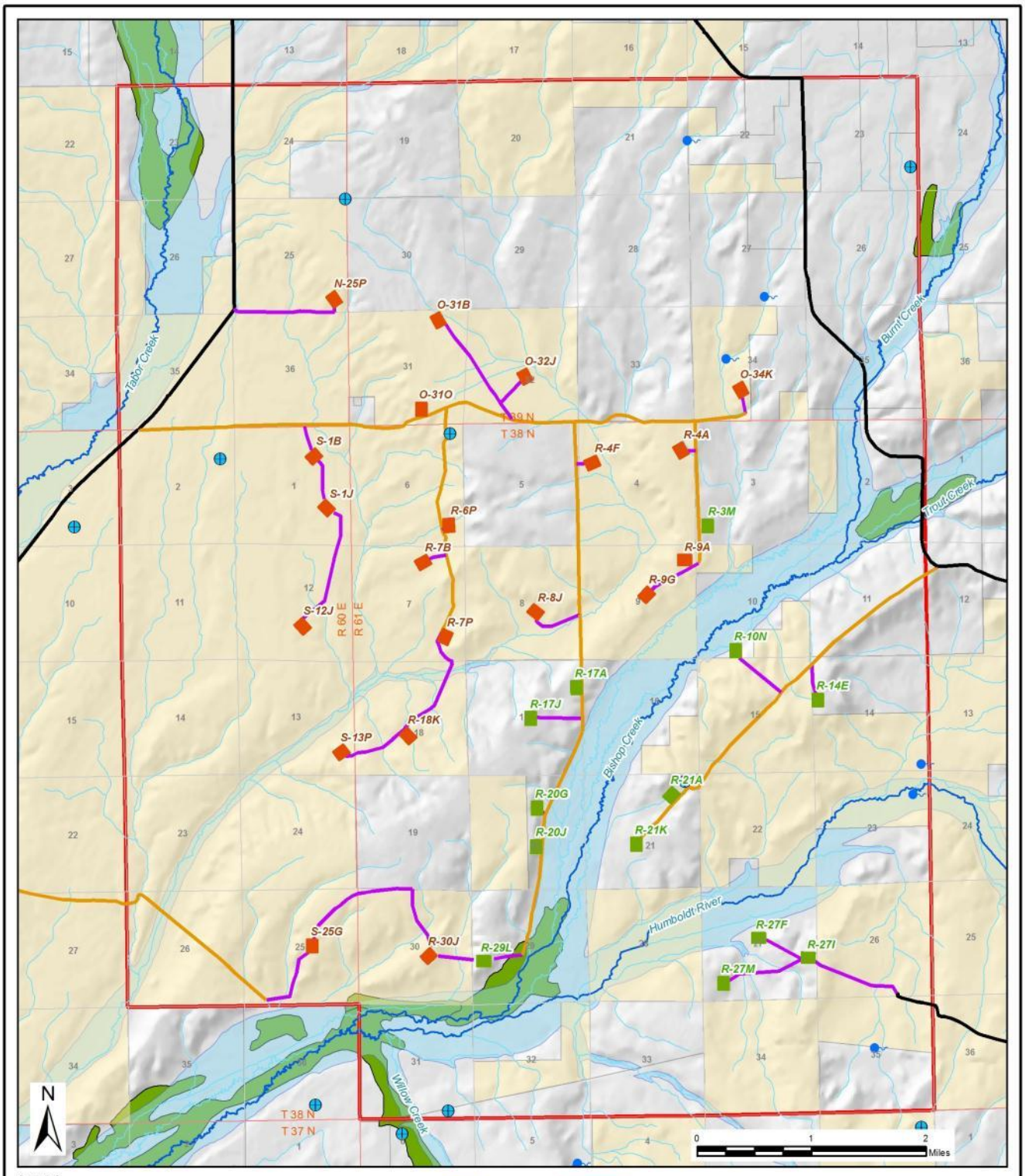



**Figure 3.2-3**
**Cumulative Flow Frequency Plots**
**of Streamflows in Northeast Humboldt River Basin**
**(from USGS Scientific Investigation Report 2009-5014)**




**Legend**

- Project Area
- Water Wells
- Springs
- Federal Lands
- Private Lands
- FEMA 100-year Floodplain
- NWI Wetlands

NOTE:
FEMA 100-year floodplain approximately correlates with the delineated riparian area.



## MAP 3.2-3

**Hydrology**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014

### 3.2.4.3 Current Conditions - Wetland/Riparian

Most of the riparian area (see Map 3.2-3) is located on private land adjacent to Bishop Creek and a small portion of riparian area within the Project Area is located on public land adjacent to the Humboldt River or on spring sources on public land. The BLM data along with USGS topography maps indicate four springs on BLM-administered land and two springs on private land within the Project Area. Springs in T38N R38E, sections 23 and 34 are reported by the BLM to have flow 1 and 3 gallons per minute, respectively. Two other springs on BLM-administered land have no overland flow and flows are not available for springs on private land. Riparian area associated with spring sources represents a small portion of total riparian area within the Project boundary. Wetland delineations were not conducted for the Project Area. Locations of riparian areas based on National Wetland Inventory - NWI (not including springs) are shown on Map 3.2-3 and are less than 0.1 percent of the Project Area.

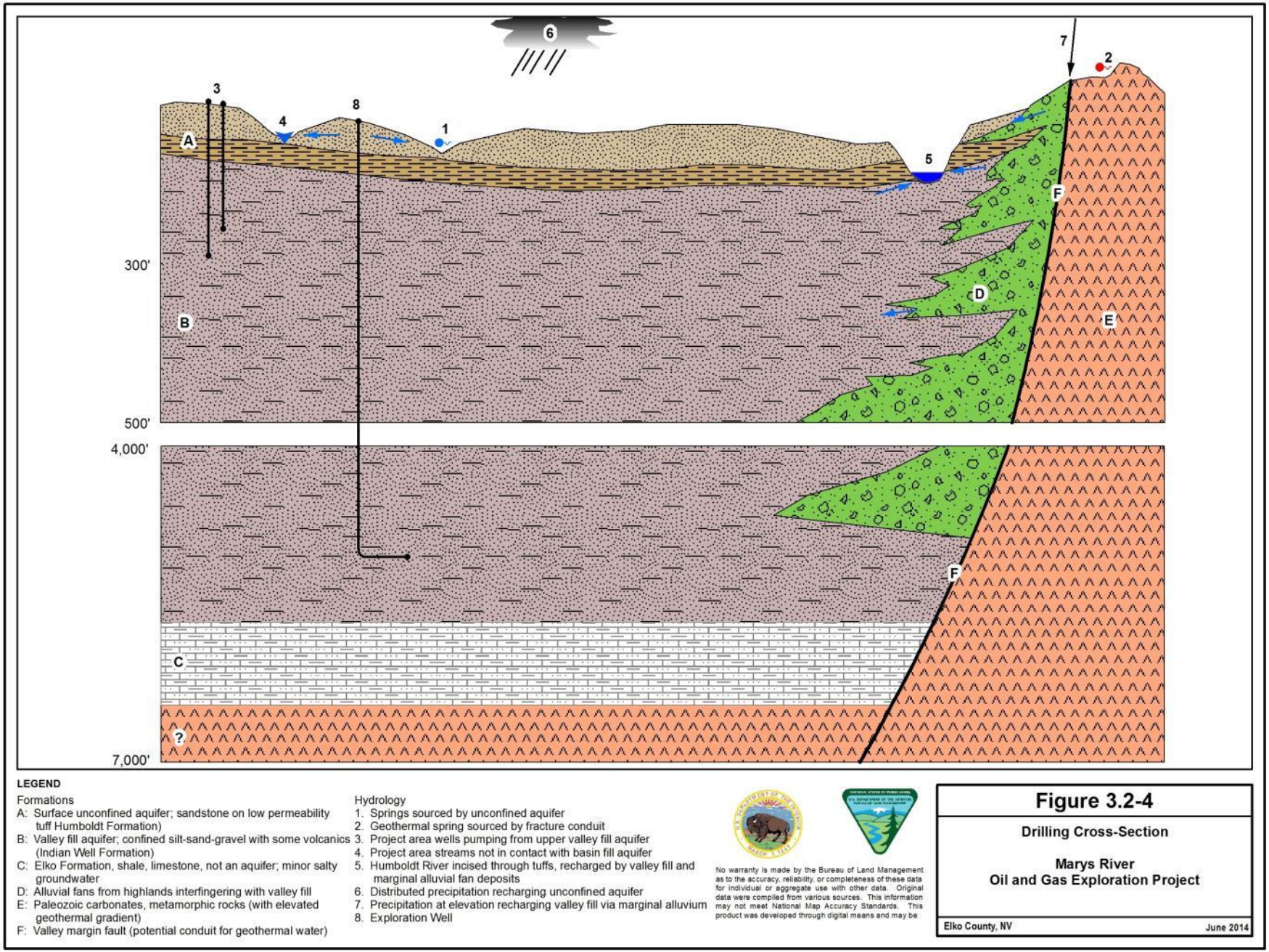
There is little information available regarding the condition of riparian areas within the Project Area. The BLM conducted lentic riparian assessments at two of the springs on public land and found that there were some issues at one of the springs as a result of grazing related impacts. The assessment at these two springs is not a large enough sample to represent riparian areas across the Project Area.

### 3.2.4.4 Current Conditions - Groundwater

Few specific data are available supporting characterization of groundwater resources within and near the Project Area, but BLM can describe groundwater in general terms using geologic and hydrologic investigations that have been conducted for the area. In general, these sources indicate that the Project Area overlies a “deep structural basin in which basin-fill deposits of quaternary and tertiary age have accumulated” (USGS, 2013) “water is present in varying quantities in these units, and moves from areas of recharge to areas of discharge.” Groundwater within the Project Area is likely recharged along the mountain fronts several miles to the north, east, and south of the Project Area (USGS, 2009). Water flows from these recharge areas at the basin margin into the streams that cross the Project Area, and through the alluvial and basin fill units in the valley.

Details regarding lithology in the Project Area have been interpolated from a 1981 report titled “Geology and Oil Shale Resources near Elko, Nevada” (Solomon, 1981), and supported by USGS Scientific Investigation Reports in 2009 and 2013 (USGS, 2009 and 2013). The stratigraphic column shown in Figure 3.2-2 shows lithology of the water bearing formations that would be drilled through. Figure 3.2-4 illustrates estimated depths of these formations. The depth of the Elko Formation is estimated by Noble to be 7,000 to 14,000 ft. Figure 3.2-4 also illustrates probable hydrologic pathways in the Project Area, but is not based on any actual mapped basin cross section.

Groundwater resources considered in this analysis span from shallow valley fill groundwater to deep valley fill groundwater. In addition, the valley is bounded by faults east and south of the Project Area (Coats, 1987) with alluvial fans spreading into the valley fill from the uplifted ranges. Flow along the fault and in the uplift mountain block aquifer to the east are different from the shallow and deep valley fill aquifer. Because of the different characteristics and uses of these waters along with the differences in potential impacts from the alternatives, these resources are discussed separately below.




**LEGEND**

Formations

A: Surface unconfined aquifer; sandstone on low permeability tuff Humboldt Formation)
B: Valley fill aquifer; confined silt-sand-gravel with some volcanics (Indian Well Formation)
C: Elko Formation, shale, limestone, not an aquifer; minor salty groundwater
D: Alluvial fans from highlands interfingering with valley fill
E: Paleozoic carbonates, metamorphic rocks (with elevated geothermal gradient)
F: Valley margin fault (potential conduit for geothermal water)

Hydrology

1. Springs sourced by unconfined aquifer
2. Geothermal spring sourced by fracture conduit
3. Project area wells pumping from upper valley fill aquifer
4. Project area streams not in contact with basin fill aquifer
5. Humboldt River incised through tuffs, recharged by valley fill and marginal alluvial fan deposits
6. Distributed precipitation recharging unconfined aquifer
7. Precipitation at elevation recharging valley fill via marginal alluvium
8. Exploration Well



**Figure 3.2-4**

**Drilling Cross-Section**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014

Shallow Valley Fill Groundwater

The information regarding the shallow valley fill aquifer is developed from known surface water characteristics, land-forms, geological investigations, and characteristics of groundwater wells drilled in and near the Project Area. The primary source of water in the unconfined surface aquifer is direct precipitation and infiltration across the basin, whereas recharge of the lower valley fill occurs via basin margin alluvial fans against the mountain fronts several miles to the east, south, and north of the Project Area. As described below, it is not likely that upper aquifers receive recharge from deeper zones.

There is some information regarding the characteristics of the groundwater aquifer at depths less than 400 feet from groundwater wells that have been drilled in the Project Area, however, there is not a lot of data regarding water quality characteristics except that water temperature is recorded for some wells, and these wells have water quality sufficient to support their beneficial uses.

A review of the NDWR well log Geographic Information System (GIS) data (NDWR, 2012) indicates there are six wells in the Project Area, most of which are used for stock watering purposes (see Table 3.2-14 and Map 3.2-3). No wells within the Project Area are stated in logs filed with the state to have water warmer than 59 $^{o}$F, but two wells (located 650 feet and 0.75 mile west of the Project Area) at similar depth near the Tabor River are reported to have water temperature 92 $^{o}$F. If valid, those elevated water temperatures at some wells might suggest geothermal water rising on fractures.

**Table 3.2-14**
**Permitted Groundwater Wells in the Marys River Project Area[1]**

| Well Log Number | Location | Owner | Use |
|---|---|---|---|
| 105118 | T39N, R61E SESE Section 23, | Gary Botts | Domestic |
| 10329 | T39N, R60E Section 25 | Bureau of Land Management | Stock |
| 24737 | T38N, R61E Section 6, NENE | Bureau of Land Management | Stock |
| 504099[2] | T38N, R60E Section 2, NENE | Bureau of Land Management | Stock |
| 2412 | T38N, R61E Section 21, NENE | Gulf Refining Co. | Unknown |
| 112206 | T38N, R61E Section 31,SWSE | Union Pacific Railroad Co. | Unused |

[1] NDWR, 2012.
[2] BLM Range Improvement point, not a NDWR Well Log Number.

Figure 3.2-5 shows the number of wells in the townships including the Project Area and their depths. Each graphic shows NDWR-registered wells as a frequency bar histogram. Most irrigation wells are 200 to 300 feet deep, tapping sandy beds of the upper Indian Well Formation with adequate water quality.

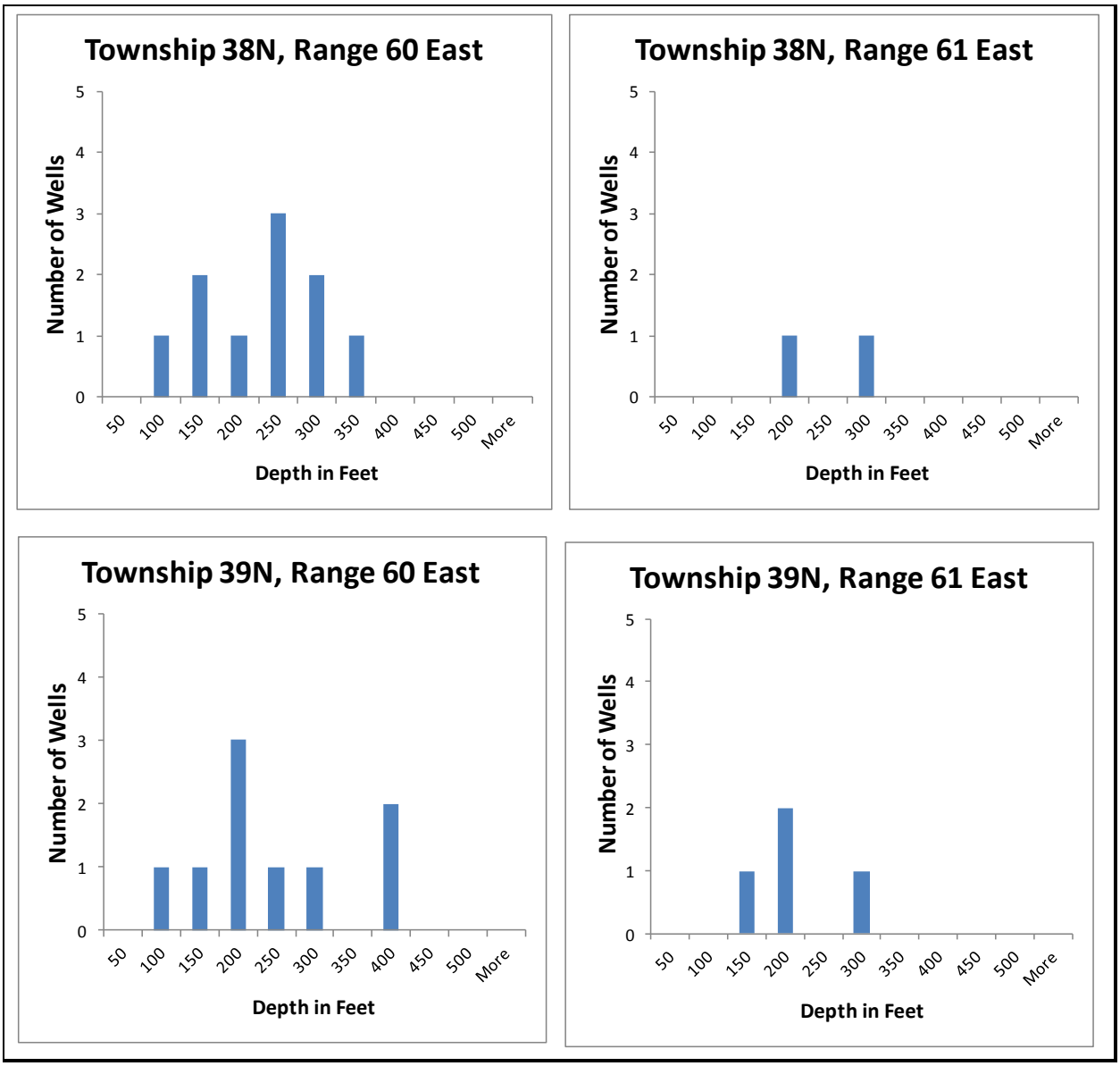


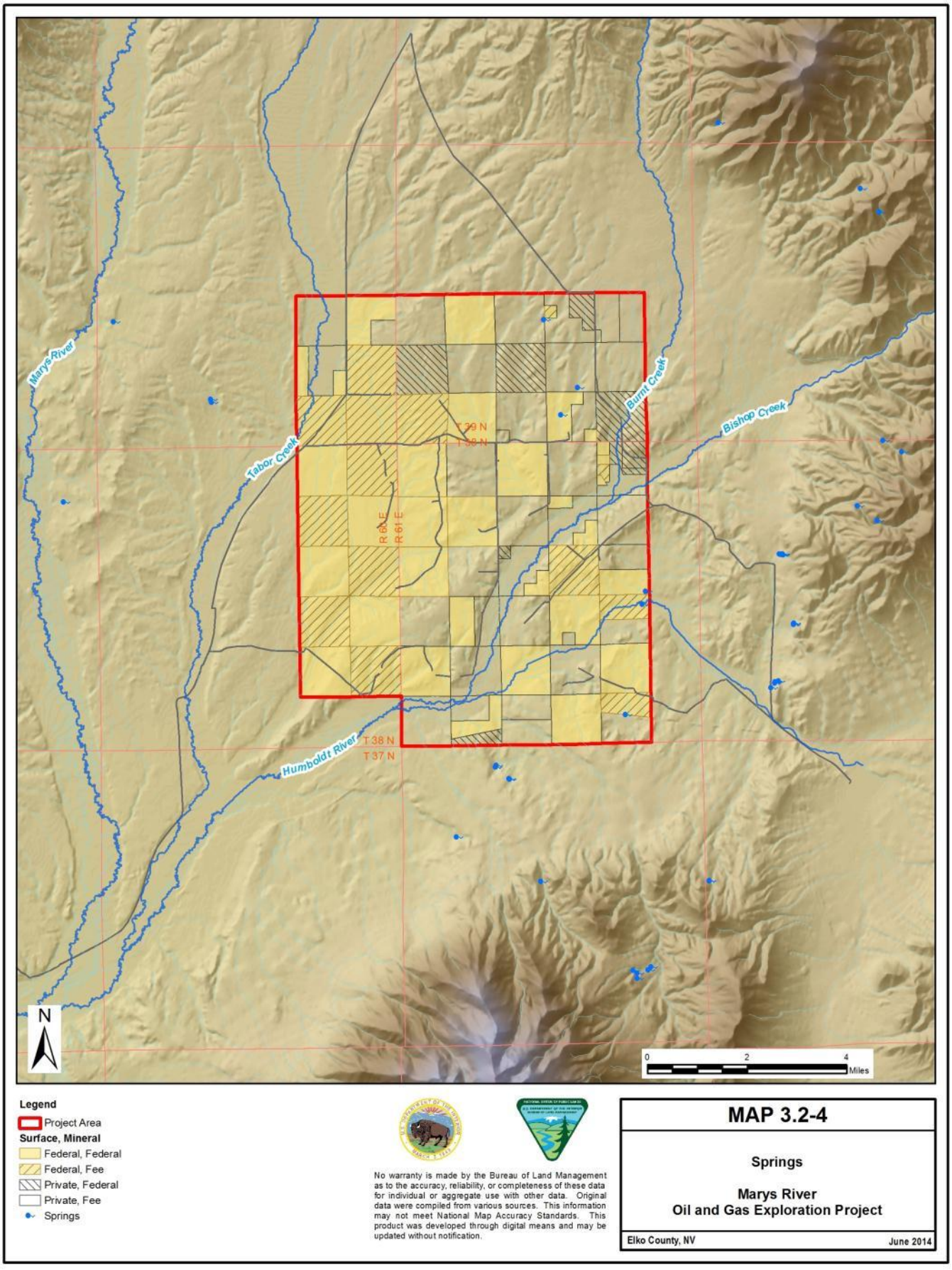

**Figure 3.2-5**
**Existing Well Depths in the Marys River Project Area**

Geological investigations indicate that there are two shallow aquifers including an unconfined surficial aquifer consisting of sands of the Humboldt Formation, isolated by a basal tuff stratum from the underlying, confined upper strata of the Indian Well Formation. The Humboldt Formation is exposed over most of the Project Area except where overlain by stream alluvium, is recharged by direct precipitation, and supports small springs in some drainages. The Indian Well Formation is a unit of sedimentary and volcanic strata, which is an aquifer in its upper extent and potentially a hydrocarbon reservoir in lower zones. The Indian Well Formation is not exposed in the Project Area but is believed to be cut into by the alluvial bed of the Humboldt River. It is more than 4,000 ft. thick in the Project Area (Solomon, 1981; USGS, 2009). As the valley subsided on faults between the highlands, alluvial fans shed off the highlands interfingered with the valley sediments. The relationships between these hydrologic units are suggested schematically in Figure 3.2-4. The stratigraphic column also suggests that there is at least one basal aquitard in the Humboldt Formation, indicated to be a volcanic ash (tuff) and many aquitards in the Indian Well Formation. These would restrict the vertical movement of water between layers, and isolate potential hydrocarbon reservoirs in the lower formation. It is noted that hydrocarbon fluid reservoirs require such containment to prevent their escape over geologic time.

Map 3.2-4 shows six springs reported in the Project Area which flow from the shallow, unconfined (Humboldt) aquifer. Topography, and lithology of the area suggest that these springs occur as a result of surface depressions which intersect a shallow aquifer unit or at a contact between a shallow unconfined aquifer and aquitard. The presence of these low flow springs attests to the basal tuff aquitard indicated in the USGS stratigraphic column, without which local recharge would percolate to the upper Indian Well Formation. The BLM has recorded a flow of 3 gallons per minute (gpm) at one spring and 1 gpm at a second spring. There is no overland flow at the other two springs on public land and it is assumed that the two springs on private land within the Project Area exhibit similar conditions because it appears that they occur within similar lithology. Water temperature in these springs is cold. The low flow and cold temperature of these waters are indications that the shallow aquifer does not receive recharge from the deep valley fill aquifer. The discussion above in Section 3.2.4.1, regarding characteristics of surface streams, provides further evidence that the shallow valley fill aquifer does not receive recharge from the deep valley fill aquifer.

Water from the upper Indian Well aquifer is used for a variety of purposes including irrigation, stock watering, and domestic supply. Annual perennial yield of the groundwater basins west of Elko (basins 42, 43, 44, and 45) is estimated by NDWR to be 83,000 acre-feet (af/y). Permitted groundwater diversions in these basins add up to 45,282 af/y. A number of center pivot irrigated fields (with groundwater wells) are northwest of the Project Area and a few others are seen on the basin perimeter. These fields have half-mile diameters, and areas of approximately 126 acres. At a consumptive use of 3.1 feet/year, each of these circles should consume 391 af/y, and the 20 circles in Tabor Creek should therefore consume 7,812 acre-feet of water; and all the irrigated fields should consume about 11,720 af/y. The NDWR indicates a net irrigation requirement for alfalfa of 3.1 feet in the Marys River area, basin 042. Pivots located off the southeast corner of the Project Area are watered with reclaimed water from the Wells sewage treatment plant rather than from groundwater wells.

Plume and Smith (2013) estimated groundwater flow out of the Marys River Basin (including catchments of Bishop and Tabor creeks but not the Humboldt River itself) to be as much as 2,000 af/yr, based on gradient and assumed transmissivity, which is substantially less than the agricultural use in the area (irrigation is estimated below at 12,000 af/yr). Both existing use and basin outflow estimates are poorly constrained, and the sub-flow of the Humboldt River floodplain is not estimated, but the report suggests a net outflow of groundwater from the basin somewhat less than the in-basin usage. Groundwater is believed to recharge the Humboldt River west of the Project Area, along the reach to the lower basin.




No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

## MAP 3.2-4

**Springs**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014

Deep Valley Fill Groundwater

Unlike its shallow counterpart, deep valley fill groundwater in the Project Area is separated from surface water and basin margins by several thousand feet of valley fill sediments. This deep groundwater is described separately from shallow water because of the 1) distance between them, 2) different set of impacts associated with the alternatives, and 3) a lack of data available regarding deep groundwater characteristics. For purposes of this analysis, the deep valley fill groundwater includes the groundwater in and near the target formations from which Noble intends to complete production wells and extract the oil and gas resource. According to Noble's projections, the target area is approximately 7,000 to 14,000 feet below the ground surface. The target is the Elko Formation; and therefore, the area described as the deep valley fill is the lower layers of the Indian Well Formation and the Elko Formation at the depths proposed by Noble.

Lithology of the deep valley fill is described by Solomon (1979) who mapped a stratigraphic column and described formations present. The Indian Well Formation consists of sandstones and volcanics, including andesite flows and tuffs, the latter of which will restrict vertical flow. Tuffs and lake bed shale may constitute both a floor to mobile groundwater and a cap or caps to hydrocarbon fluids at different locations across the Project. Kerogen in the Elko Formation is the likely source of hydrocarbons in the valley, but productive reservoirs are likely to be permeable strata above the Elko Formation. The Elko Formation (containing oil shale source rocks and hydrocarbon exploration targets) consists principally of limestone and shale according to the stratigraphic column, and therefore, does not likely contain water of usable quality. Groundwater in the Elko Formation can be expected to be saline and very slow moving, and negligible in basin hydrology.

Little is known about water resources in deeper valley fill groundwater in the Project Area because no deep well logs are available, and a lower boundary between mobile groundwater and stagnant formation fluids (possibly including oil and gas) has not been identified. This boundary may or may not be a single aquitard within the Indian Well section across the Project Area. Slow moving groundwater in the base of the aquifer may be saline from prolonged contact with rock, and have poor quality. General hydraulic gradients in the area which suggest flow from the mountains to the Humboldt river likely also apply to this deep aquifer, and it too likely discharges to the lower Humboldt River Basin (USGS, 2009). Recharge of the deepest mobile water zones occurs primarily at valley margins from Paleozoic rocks and the margin faults.

The stratigraphic column which was mapped on the basin margins suggests the basin fill consists of sandstone, siltstone and some volcanics, and appears likely to be a single aquifer system. However, the published stratigraphic column may represent only a fraction of the central valley fill which Noble asserts is very deep, and can be presumed to contain thousands of feet more of re-worked sediments and shales for which there is no available information in the Project Area. The deep valley fill aquifer may be a package of aquifers and aquitards. An andesite flow shown in the center of this formation in the stratigraphic column is not likely to be extensive (this is a viscous lava type likely to be present as one or more narrow flows into the valley from the highlands), and to be permeable because of jointing.

Mountain Block Groundwater

The information regarding mountain block groundwater is developed from characteristics of springs which emanate along mountain front fault lines along with the few groundwater wells that are drilled into the areas near these faults. Recharge to the mountain blocks is from rainfall and snowmelt in the mountains. Recharge may also occur from distant, unknown sources. Groundwater in mountain blocks flows down-gradient to the valley fill aquifers. The presence of numerous springs and gaining streams along the valley margins (see Map 3.2-4) indicates that faults transmit a portion of this recharge to the ground surface where it is discharged into surface streams (Heilwell and Brooks, 2011).

Springs along fault traces to the east and northeast of the Project Area vary in flow rates and water quality characteristics. Some of them have elevated water temperatures indicating they are heated by deeper circulation and/or exist in areas with elevated geothermal gradient. There are several low flow springs to the east of the Project Area which discharge hot water and gas and are high in sulfur and other dissolved solids but water from these sources infiltrates before reaching the Project Area. Other springs east of the Project Area discharge large amounts of warm water, which along with surface runoff, support perennial flow across the valley. Warm springs are heated by deeper circulation in areas with an elevated geothermal gradient in the mountain block to the east of the Project Area. Springs along the mountain front to the south discharge large amounts of cold water which flows across the southwest portion of the Project Area.

Some wells on the valley margin, and even some in the valley (two on Tabor Creek, 300-400 feet deep) are noted as having warm (geothermal) water (60$^{o}$C or more). Water temperature records are sparse. Warm water occurs where there is heat flow in underlying rocks, by shallow igneous features or by convection on conduits such as faults.

### 3.2.4.5 Environmental Consequences

#### 3.2.4.5.1 Proposed Action Alternative

**Surface Water (including Floodplains and Wetland/Riparian)**

Potential impacts of industrial activity to surface water may include erosion and sedimentation from disturbed areas, and disruption of channels and riparian erosion by crossings, contamination by spills and leaks, and depletion of flows by drawdown of groundwater by extraction. Implementation of Project design features as detailed in Chapter 2 would reduce erosion and sedimentation. These design features would prevent industrial surface water contamination except in extremely rare events, and would reduce the impacts to surface water if they were to occur.

As with any project which creates new surface disturbance and alters physical properties of the soil, there is likely to be some increased erosion and deposition of soil material in surface waters. The Proposed Action includes activities that are designed to minimize these effects but they would likely still occur, especially during exceptional runoff events. Erosion from well pads and other disturbed areas would be prevented through BMPs used for stormwater and sediment control. Erosion and deposition is a naturally occurring process in the watershed and the Proposed Action would add a small amount to these effects.

Runoff from areas treated with magnesium chloride (MAG) would have elevated chloride concentrations, but these concentrations would be well below maximum contaminant levels. Some studies have shown harmful effects to surface and groundwater quality from application of MAG along with de-icing chemicals, but these studies occurred in watersheds with a much more concentrated level of development than that which is proposed in the target area. In addition, most of the contamination in those studies resulted from the use of de-icers which is not proposed for this Project (Addo et al, 2004). It is expected that runoff from treated roads in the Project Area would have some elevated chloride levels, but concentrations would be reduced through dilution and adsorption onto soil particles before entering water resources. Likewise, other proposed treatments such as “DirtGlue” would not be expected to impact water resources. The dust control program comes under NDEP permitting (Surface Area Disturbance Permit – SAD and Dust Control Plan) and requires disclosure of proposed chemical agents.

No damming or diversions would be made in or outside channels or riparian areas, other than temporary stormwater control berms at drilling sites. No surface water would be withdrawn for any purpose, nor any discharge made to stream channels. Project disturbance would avoid

streams, creeks, and wetland areas (Noble, 2014). Avoiding these areas by 400 feet would minimize potential effects to these areas.

The presence and use of industrial chemicals directly related to the Project introduces the potential for spills and leaks to impact surface waters. Potential contaminants include diesel fluid, gasoline, lubricants, and other material involved in pad and well construction. The potential for leaks and spills to affect surface waters is greatly reduced by the environmental protection measures described in Chapter 2. Spill prevention plans and chemical staging and containment are designed to prevent contamination of soil and runoff water. Disposal wells would have their own containment including tanks and lined berms to prevent any leaks or spills escaping. Fueling would not occur within 400 feet of streams, creeks, springs, or wetlands. Toxic materials would be fully contained and would not be subject to the effects of flood or rainfall events. With implementation of the above described measures, potential impact to surface water would be prevented except during very rare events or accidents.

The proposed diversion of groundwater resources for drilling, hydraulic fracturing, and dust suppression purposes could potentially affect groundwater levels and these impacts could potentially reduce surface water flow in the short-term. Flow reductions in area streams would not be a large portion of streamflow, because most of the diversion is temporary, and diversion represents a small portion of available water in the basin. Groundwater diversions located near small springs or low flowing streams in the area could result in reduction of a considerable portion of flow, but the magnitude of these impacts would be less than flow variability caused by short and long-term climate trends. To prevent considerable impacts to surface water quantity from occurring, Noble could provide the BLM with all data needed to determine the level of effects on surface water from any proposed water wells before diversion occurs. Analysis of safe yield by a BLM hydrologist before they can be pumped would minimize these potential impacts. The Groundwater section, below, provides additional detail regarding impacts to groundwater levels and quality from the Proposed Action.

Other streams and springs in the Project Area are isolated from the aquifer which would be used. Flow reductions in the river would not be significant, because wells are far from the river, and diversion is temporary and a small fraction of the river flow. To prevent considerable impacts to surface water quantity from occurring, Noble could analyze safe yield and impacts to streamflow from pumping tests before diversion occurs. The Groundwater section, below, provides additional detail regarding impacts to groundwater levels and quality from the Proposed Action. Water well depth would depend on the findings of the water well driller and well testing to assess safe yield.

**Groundwater**

Impacts to groundwater could potentially occur from construction of well pads and roads, drilling and completion of wells, and from production. Potential impacts could occur from the following:

- Contamination by spills or leaks of shallow aquifer;
- Drainage (depletion) of shallow aquifer by penetrations;
- Depletion of valley fill aquifer by diversions;
- Cross-aquifer leaks via production wells;
- Escape of hydraulic fracturing fluids from the target intervals to the surface or aquifers;
- Inducing seismicity (earthquakes) by high pressure injection of wastewater in disposal wells;
- Subsidence; and

- Potential effects of underground disposal of produced water (UIC).

**Contamination by Spills or Leaks of Shallow Aquifer.** Spills and leaks impacting the shallow aquifer would be through infiltration of surface spills, addressed above (Surface Water), and the potential for effects is essentially the same. The spill prevention plan, containments, and BMPs are designed to prevent such impacts. Leachates from cuttings have also historically been of concern as potential sources of contamination of shallow aquifers. Contamination would be prevented by following standard operating procedures as described in the Proposed Action. The water based mud used in drilling would not be expected to contain toxic materials, but the cuttings produced would be sampled before disposal to ensure they are disposed of properly. If it is determined they are non-toxic, these cuttings would be used in well pad reclamation. As proposed, these materials would be buried on-site at depths greater than 3 feet to avoid potential impacts to plant root zones. All materials will attain pertinent State of Nevada waste standards prior to on-site burial. Cuttings that do not meet pertinent State of Nevada waste standards would be disposed at an approved facility (Clean Harbors) located between Wendover, Nevada and Salt Lake City, Utah.

**Drainage (depletion) of Shallow Aquifer by Penetrations.** Drilling of wells through different aquifers introduces the potential for movement of water from one aquifer to another along the well borehole. Contamination or drainage of the shallow aquifer via leaky boreholes to lower aquifers is precluded by the casing schedule. Surface casing would be set to a depth of 500 feet, well below the surface, unconfined aquifer, and cemented in before proceeding through the lower section. Intermediate and production casings triple the casing seal through the shallow aquifer.

**Depletion of the Valley Fill Aquifer by Diversion.** The proposed diversion of groundwater resources for drilling, hydraulic fracturing, and dust suppression purposes, could potentially lower groundwater levels. Such extractions would diminish the groundwater resource making a lower quantity of water available to groundwater users. These effects could also be transmitted upward through the aquifer and reduce surface water flow as described above (Surface Water).

Impacts to basin groundwater levels are not expected to impact other groundwater users because under the Proposed Action only a small portion of water available in the basin would be diverted. The proposed diversion is only a temporary diversion of about 260 acre feet of water which would occur in the first two years of the Project. NDWR has determined that there are 83,000 acre feet of groundwater in the basin of which 45,282 are currently permitted for use. It is expected that Noble would also divert some unknown quantity of water in the long term for dust suppression and other purposes, but this diversion would be a small fraction of the temporary diversion, and is likewise, not expected to impact other users or surface water resources.

The potential for damage to existing users can be grossly gauged by comparing the quantity of water proposed to be pumped to that used to irrigate one of the center pivot fields to the northwest of the Project, or to the capacity of municipalities which have indicated their readiness to supply the desired water. As discussed above, the water used in one growing season in one quarter-section irrigated field is sufficient to drill and complete all of the wells proposed in this program. There are approximately 20 center pivot irrigation fields in Tabor Creek to the northwest of the Project Area, so that all of the proposed Project's water use could add 5 percent to this existing demand for one growing season. NVEnergy has stated there is adequate pumping capacity in existing municipal wells in Wells and Elko to supply the Project demand, and that the aquifers which they pump from are capable of supporting almost twice the current usage of existing Wells and Elko City water rights. Although the water resources of the valley fill aquifers have not been measured, these observations show the Proposed Action water demand would be small compared to the resource.

Proposed groundwater extractions in the Project Area of 70 percent of water needed (182 acre-feet) would temporarily lower groundwater levels near the diversion, but the BLM mitigation described below would ensure that these diversions would be far enough away and/or pump water from different depths, that only a small lowering of the water table would be observed in existing diversions. Figure 3.2-4 shows schematically the relation of the target zone activities (hydraulic fracturing and testing) to the shallow aquifer supporting springs, existing supply wells, and basin groundwater systems. Proposals to test the aquifer, or an interval of it, would allow determination of safe pumping yields, so that the aquifer is not drawn down to the extent of causing damage to the supply from existing wells. As detailed in the Mitigation Measures, a BLM Hydrologist would be involved in selection of water well sites to ensure that impacts to existing water sources does not occur.

**Cross-Aquifer Leaks via Production Wells.** The potential exists for the boreholes of proposed wells to act as conduits for water and gas to move between deep and shallow aquifers and potentially to the surface. If this were to occur, shallow aquifer water which supplies water for irrigation and domestic use could be contaminated by water and gas of naturally poor quality from deep aquifers. These cross-aquifer leaks are precluded by cemented casing strings sealing the well off from shallow and valley fill aquifers, and sealing the boring between them (see Figures 11 and 12 in Appendix D). Each casing string would be cemented and the cement seal tested by geophysical logs to ensure integrity. During drilling, the open section of borehole beyond the last casing would be controlled by mud pressure. Should high formation pressures be encountered greater than the mud column weight, the BOPE would be ready to cut off the drilling string and seal the borehole with hydraulic rams at the collar. Baseline sampling and analysis of water quality in existing wells (see Appendix F) would ensure that, if there were any question of drawdown or water quality impacts due to Noble's activities, it could be compared to prior conditions. The BLM's review and approval of sampling locations described as mitigation below, would ensure that adequate water resources are sampled to establish a base-line water quality comparison.

**Escape of Hydraulic Fracturing Fluids from the Target Intervals to the Surface or Aquifers.** Recently, there have been claims that escape of hydraulic fracturing fluids, native gas, and deep groundwater could theoretically occur via the borehole, through induced fractures, or via natural conduits in the subsurface. The casing and cement seals are designed to prevent borehole leakage; hydraulically induced fractures do not extend far from the target zone; and natural conduits for flow from the target zone should not exist. The casing schedule includes production casing to the bottom of the boring, fully cemented in place, and perforations must be made through casing and cement to allow the injection of fracturing fluids.

Characteristics of Project Area lithology suggest that there is very little potential for the hydraulic fracturing process to create new conduits from deep groundwater to shallow groundwater or surface springs. In order for these new conduits to be created, the fracture would need to be several thousand feet long and travel through multiple confining strata. If natural conduits which interact with shallower groundwater did exist closer to the target area there would likely be some evidence of these conduits. There is no evidence of a natural conduit from an oil/gas reservoir in the Project Area at the surface or in shallow groundwater. Fractures induced by hydraulic pressure radiate from the well, but the pressure is rapidly dissipated by the expansion of the cracks and by connection to existing formation porosity. No fracture is likely to extend more than a few percent of the overlying rock column which would be about 7,000 ft. thick. Horizontal fractures would need to travel several thousand feet to a fault zone, and then affected water would need to travel upwards along the fault to reach the surface.

Contamination of surface water or usable aquifers as a result of natural movement of hydraulic fracturing fluids from deep to shallow groundwater or surface water is not expected to occur. As discussed in Section 3.2.4.4, the characteristics of the valley fill suggest that upward movement

through these layers does not occur, or is at most very slow. Horizontal movement and subsequent vertical movement and discharge elsewhere in the basin would likewise require a very long time frame (USGS, 2007) wherein any toxicity would be filtered and buffered by valley fill. Finally, if natural conduits existed which allowed upward flow (such as faults or joints), the fracturing procedure would discover those leaks as pressure bleeds, and there would be no oil or gas target. It is extremely improbable there should be open fractures existing at the target depth with native rock pressure exceeding 5,000 psi.

**Inducing Seismicity (Earthquakes) by High Pressure Injection of Wastewater in Disposal Wells.** Induced seismicity has been studied by the Committee on Induced Seismicity Potential in Energy Technologies (2012) commissioned by the National Resources Council. This study concluded that hydraulic fracturing has had no demonstrable connection to induced seismicity; and that waste injection wells have had few associations with sensible seismicity (earthquakes) except in a few instances where the fluids were injected into fault zones. The committee investigated the history and potential for induced seismicity associated with geothermal energy (which extracts and sometimes injects fluids in hot zones typically linked to faults), oil and gas production, waste disposal injection, and carbon capture and storage. A more comprehensive survey by the Society of Petroleum Engineers (2013) contains a large number of publications affirming the NRC committee's findings with a more extensive database. This literature documents that microseismic events commonly occur in short-lived swarms in some locations without oil and gas activity, that some such swarms have actually been linked to oil and gas waste injection and have been controlled by managing waste injection depths, and that no significant damage has been caused by UIC-induced seismicity.

A few researchers have made the claim that waste fluid injection (UIC disposal of flowback and produced water) can result in large earthquakes. They recently correlated some earthquakes felt in fluid injection areas in Oklahoma and Colorado with distant natural events (large earthquakes), suggesting the distant events triggered the local stress relief. Others have argued while these earthquakes occurred during or following injection, there are no data to suggest that they were caused by the injection. Most events associated with fluid injection (such as the micro-events monitored at large volume disposal sites) are so small as to not be detectable by people. An earthquake with magnitude 6 occurred northeast of Wells in 2008, with an epicenter on the east side of the Snake Mountains block. A magnitude-frequency plot of all earthquakes recorded in Elko County by the Nevada Seismological Laboratory between 1950 and 2014 suggests the Well Magnitude 6 quake has a return period of several hundred years, and this area has low seismic activity compared to the rest of the state. The existing seismic detection array is not capable of detecting events smaller than about M 3, and thus of any impacts of fluid injection in UIC wells. Figure 3.2-6 shows this ANSS data, with the odd low magnitude tail due to the brevity of the sensitive seismographic record.

The University of Nevada Seismological Laboratory currently monitors a total of 115 seismograph stations across the state of Nevada (the number varies slightly through time). The majority of the seismographs are located along the western side of Nevada. Five seismographs are currently located in northeastern Nevada. Three Netquake stations, located at Winnemucca (WNMCA), Elko (SPCK), and Wells (RUBY), are designed to detect major earthquakes with strong shaking and are located in the urban areas. Two Broadband stations, ELK located on the northeast end of the East Humboldt Range and LB_BMN, located south of Battle Mountain, are capable of detecting earthquakes in the range of magnitude 1 to 2.5 (micro-seismic events) if microearthquakes were to occur in the vicinity of the Marys River Project Area. The two Broadband stations would alert scientists that micro-seismic events were occurring but the scientists would be unable to triangulate the location. Regional Station Map located at: http://www.seismo.unr.edu/Monitoring.

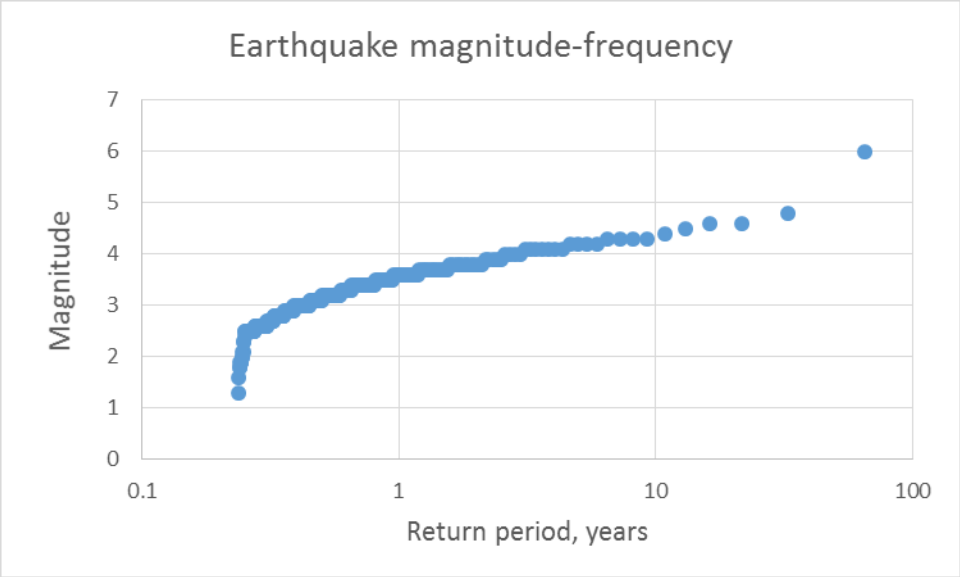



**Figure 3.2-6**
**Elko County Seismicity, 1950-2014, ANSS record of all quakes recorded between Latitudes 39 and 42 N, and Longitudes 114 and 117 W.**

**Subsidence.** Extraction of fluids (oil, gas or water) may cause compaction of the rocks in which they reside, resulting in land subsidence. This is well documented in several large producing wellfields and groundwater extraction centers, and has been most damaging and publicized in Houston and California oil fields near sea level. The potential for subsidence caused by the Project is negligible because it is an exploration program, not a large scale production field, and the target horizons are at considerable depth in competent strata including shales, tuffs and volcanic flows. Should a substantial oil discovery lead to subsequent large scale oil extraction, geophysical and core logs obtained in this exploration Project would allow estimation of subsidence potential. Such hypothetical future subsidence could slightly affect watercourses, casing silting in some reaches and channel deepening in others. Such effects are conjectural, unlikely and not feasible with the existing exploration program.

**Potential Effects of Underground Disposal of Produced Water (UIC).** Some historic waste injection wells have had problems with leaking and contaminating formations, but the UIC program regulates construction and operation of wells to prevent such leaks. UIC wells are permitted under the federal UIC program rules administered in Nevada by the NDEP. The multiple and redundantly isolating casing strings and seals, and testing and maintenance as required under the UIC permit, would reduce the probability that waste disposal wells would impact ground and surface water. The wellhead would have storage and containment to prevent and capture potential spills.

NDEP regulation on UIC wells is more restrictive than EPA's, in that aquifer exemptions are not favored. Aquifer exemptions in some states allows waste injection into aquifers with poor quality (typically high salinity) groundwater. NDEP rules that water of any quality could feasibly bet treated. This means that UIC permitting in Nevada should disqualify the target horizon as an aquifer, not on the basis of water quality, but on depth and yield criteria (the formation is too deep and of low yield so that it could never economically deliver usable water.

## Mitigation Measures

The BLM has identified the following mitigation measures to further minimize impacts to water resources:

- Any new water wells within the Project Area should be reviewed and approved by a BLM Hydrologist prior to diverting water for the Project. Noble should provide BLM with well logs, pump tests, monitoring of nearby water sources, and any other information needed to confirm that new diversions would not impact existing water resources.
- No fracturing stimulation process should be initiated without confirmation by a BLM hydrologist that sufficient baseline water quality data have been collected at nearby water sources. If insufficient sampling has occurred, BLM may require Noble to sample additional sources as identified by the BLM.
- All water wells should be fitted with back-flow preventers to prevent contamination of the aquifer.
- Noble should provide copies of agreement with the City of Elko and/or City of Wells to the BLM prior to use of the water.
- Well pad R-10N is proposed to be located within 400 feet of riparian areas and BLM suggests that the well pad be moved outside of the 400 foot buffer zone.
- No fracture stimulation process should be initiated without review by the BLM and the NDOM of the Cement Bond Log and subsequent approval of a sundry notice with specific details of the fracture stimulation process.
- A list of all chemicals to be used in a hydraulic fracturing operation should be provided to the BLM and the NDOM for approval prior to any hydraulic fracturing operation. The list should include the following: trade name, supplier, purpose, ingredients, Chemical Abstract Service Number (CAS#), maximum ingredient concentration in additive (percent by mass), and maximum ingredient concentration in hydraulic fracturing fluid (percent by mass).
- All pressures applied during the hydraulic fracturing process should be monitored and recorded. Maximum hydraulic pressure approved by the BLM and the NDOM should not be exceeded. Recorded hydraulic fracturing pressures should be provided to the BLM and the NDOM, if requested.
- If Noble were to obtain an Underground Injection Control Permit and if broadband stations ELK and LB_BMN were to detect microearthquakes that seismologists had reason to believe could have been caused by Noble's activities, then BLM and Noble would work with Nevada Division of Minerals and the University of Nevada Reno Seismological Lab to determine if installation of a seismograph in the vicinity of the Marys River Project Area would be warranted. If the seismograph is determined to be necessary, Noble should install, monitor, and report all findings until the parties (noted above) have collected sufficient information on the cause of the microearthquakes to make a management decision.
- Where possible microseismic events should be recorded and data provided to the BLM; method for data collection would be either by a seismic listening tool downhole or a microseismic array on the surface near the well or other appropriate technology.
- Hydraulic fracturing fluids that are flowback from the wellbore at the conclusion of the fracturing procedure should be placed and stored in "Baker" tanks or similar storage containments. Prior approval by the BLM or NDEP should be obtained if an alternative storage is to be utilized. The method and location for final disposal of the flowback fluids should be approved along with the fluid quality analysis to be done.
- Prior to the hydraulic fracturing completion process Noble should provide the BLM and NDOM the following:
    - The number of stages to be utilized.
    - Measured depth/true vertical depth to each stage.
    - The length of each stage.
    - All intervals to be perforated in measured depth/true vertical depth.
    - Number of shots per foot, diameter of perforations.

#### 3.2.4.5.2 No Action Alternative

Under the No Action Alternative, there would be no impacts from either the Proposed Action Alternative or the Visual Alternative to the hydrology and riparian/wetland resources in the Project Area.

#### 3.2.4.5.3 Visual Alternative

Effects to hydrology and riparian/wetland resources under the Visual Alternative would be the same as those described above for the Proposed Action Alternative.

### 3.2.4.6 Cumulative Effects

Cumulative effects to water resources in the CESA occur as a result of a variety of natural and man-made factors including climate change, flooding, drought, wildlife utilization, livestock grazing, and upstream water diversions. Water quality and riparian areas are negatively affected by these impacts and it is apparent that these resources have already sustained substantive cumulative effects as shown by the exceedance of water quality criteria along with large scale alteration of basin hydrology as a result of water diversion. Proposed expansion of the Bishop Creek Dam would likely increase the intensity of such negative impacts. The described cumulative effects would continue under the No Action Alternative. As described above, the Proposed Action and the Visual Alternative could result in additional impacts to water quality and riparian areas; however, with implementation of Project design features including adherence to the Stormwater Pollution Prevention Plan and Spill Prevention Plan, cumulative impacts would not increase significantly under the Proposed Action.

## 3.3 BIOLOGICAL RESOURCES

### 3.3.1 INVASIVE NON-NATIVE SPECIES AND NOXIOUS WEEDS

### 3.3.1.1 Current Conditions

Both invasive non-native species and noxious weeds are known to occur within the Project Area. Both are known to have detrimental impacts on both vegetation and wildlife habitat. Noxious weeds are legally defined by federal, state, county, and local governments. These plants are specified as noxious because they are known to have proportionally large detrimental effects.

The Nevada Department of Agriculture (NDOA, 2012) has responsibility for jurisdiction, management, and enforcement of the state's noxious weed law; species on Nevada's noxious weed list should be controlled on private and public lands. The 47 noxious weed species included on Nevada's list are designated as Category A (30 species), B (9 species), or C (8 species) as defined under the Nevada Revised Statutes (NRS Chapter 555 – Control of Insects, Pests and Noxious Weeds). A list of these noxious weeds is provided in Appendix L. The Category A list includes species that are not found or are limited in distribution within Nevada that must be eradicated. Successful treatment options generally exist for these species. Category B listed species are those weeds that may be abundant in localized areas but generally are not well established in Nevada. Reasonable treatment options for these species exist and are generally required to be treated where possible, especially in areas where populations are not well established or previously unknown to occur. Category C listed species are generally widespread and established in many counties of the state, and treatment is done at the discretion of the state quarantine officer. Under EO 13112, it is the policy of the land management agencies to prevent introduction of noxious weeds, invasive and non-native species, and to control their impact. The BLM Elko District is actively involved to control and minimize weed infestations within Elko County.

The NDOA (2001) and the BLM continue to map noxious weeds throughout Nevada. A rapid expansion of noxious weeds has been documented as having occurred within Elko County. Between 1998 to 2001, 13 species expanded by an average of 24 percent (BLM, 2001 as cited in Kadrmas, et al., 2002). As of 2008, at least 28 noxious and invasive weed species have been documented in Elko County, of which 24 occur on the Nevada Noxious Weed List, including 14 that are on the Category A list (Elko County, 2008).

Biological surveys were conducted from March 1 through April 5, 2012 within the Project Area; one species on Nevada's noxious weed list was observed – Canada thistle, a Category C noxious weed, within riparian and playa vegetation types (HWA, 2012). Infestations of two Category B species (Russian knapweed and Scotch thistle) and two Category C species (whitetop and perennial pepperweed) are known to occur within the Project Area (Mulligan, 2012). Cheatgrass was observed throughout the Project Area (HWA, 2012). Table 3.3-1 identifies the noxious weed species listed by Nevada and those species that are known to occur in Elko County.

Cheatgrass, an invasive non-native plant, has been documented within the Project Area. Cheatgrass is prone to dominate the landscape and prevent establishment of native perennial species, decreases forage, and increases risk of frequent high intensity rangeland fires (Knapp, 1996).

**Table 3.3-1**
**Noxious Weeds and Invasive Non-Native Species Observed within Elko County/Project Area**

| **Common Name**<br>**Scientific Name** | **Weed Characteristics[1]** | **Potential in Project Area[2]** |
|---|---|---|
| **Nevada Category A Weeds** | | |
| Spotted knapweed<br>*Centaurea masculosa* | Dry, well-drained soils; infests rangelands, waste areas, and roadsides. | Elko County |
| Yellow starthistle<br>*Centaurea solstiltialis* | Arid and semi-arid rangeland, pastures, cultivated fields, waste areas, and roadsides; prefers shallow, gravely soils. | Elko County |
| Squarrose knapweed<br>*Centaurea virgate* | Infests rangelands, waste areas, and roadsides. | Elko County |
| Rush skeletonweed<br>*Chondrilla juncea* | Rangeland, cropland, rights-of-way, and waste areas; prefers thin rocky soils or gravelly to sandy soils. | Elko County |
| Houndstongue<br>*Cynoglossum officinale* | Moist areas; often found in pastures, roadsides, fence lines, waste areas, and along waterways. | Elko County |
| Black henbane<br>*Hyoscyamus niger* | Open sites with well-drained soils; infests roadsides, waste areas, field borders, pastures, and rights-of-way. | Elko County |
| Common St. Johnswort/Klamath weed<br>*Hypericum perforatum* | Coarse-textured, gravely, well-drained soils in old meadow, pastures, right -of-ways, and waste areas. | Elko County |
| Dyer's woad<br>*Isatis tinctoria* | Broad range of sites; often infests waste areas, roadsides, rangeland, pastures, and crop fields. | Elko County |
| Dalmation toadflax<br>*Linaria dalmatica* | Dry, well-drained, gravely soils; often infests rangelands, waste areas, roadsides, right-of-ways, and other disturbed sites. | Elko County |
| Yellow toadflax<br>*Linaria vulgaris* | Coarse soils; often infests rangelands, waste areas, and roadsides. | Elko County |
| Purple loosestrife<br>*Lythrum salicaria, L.virgatum and their cultivars* | Wet areas; often in marshes, and along edges of pond and waterway, and in riparian areas and floodplains. | Elko County |
| Sulfur cinquefoil<br>*Potentilla recta* | Mesic and xeric disturbed sites, including rangelands, waste areas, right-of-way, and roadsides. | Elko County |
| Mediterranean sage<br>*Salvia aethiopis* | Pastures, meadows, rangeland, and other open disturbed areas. | Elko County |

| Common Name<br>Scientific Name | Weed Characteristics[1] | Potential in Project Area[2] |
|---|---|---|
| Sow thistle<br>*Sonchus arvensis* | Moist (poorly drained), fine-textured and fertile soils; often infests crop fields, gardens, waste areas, and ditch banks. | Elko County |
| **Nevada Category B Weeds** | | |
| Russian knapweed<br>*Acroptilon repens* | Cropland, rangeland, riparian and waste areas. | Elko County, On-Site |
| Musk Thistle<br>*Carduus nutans* | Cropland and rangeland, rights-of-way, riparian areas, and meadows. | Elko County |
| Diffuse knapweed<br>*Centaurea diffusa* | Dry, well-drained soils; often infests rangelands, waste areas, and roadsides. | Elko County |
| Leafy spurge<br>*Euphorbia esula* | Wide range of sites; often found in pastures, waste areas, rangelands, field borders and long waterways. | Elko County |
| Scotch thistle<br>*Onopordum acanthium* | Waste areas, right-of-ways, pastureland, rangeland, and riparian areas. | Elko County, On-Site |
| Carolina Horsenettle<br>*Solanum carolinense* | Sandy, well-drained soils; often infests crop fields and pastures. | Elko County (only) |
| White horse-nettle<br>*Solanum elaeagnifolium* | Rangeland, roadsides, waste areas, crop fields, and meadows. | Elko County |
| Medusahead<br>*Taeniatherum caput-medusae* | Sparsely vegetated rangeland degraded to low seral stage; clay soils. | Elko County |
| **Nevada Category C Weeds** | | |
| Hoary cress (whitetop)<br>*Cardaria draba* | Disturbed areas and in croplands, rangelands, and riparian areas. Prefers alkaline soils. | Elko County, On-Site |
| Water hemlock<br>*Cicuta maculata* | Moist soils; often in crop fields, roadsides, waste areas, and along waterways. | Elko County |
| Canada thistle<br>*Cirsium arvense* | Disturbed sites; deep, loose, cool soils. | Elko County, On-Site |
| Poison hemlock<br>*Conium maculatum* | Borders of pastures and cropland; tolerates poorly drained soils and occurs in riparian areas. | Elko County |
| Perennial pepperweed<br>*Lepidium latifolium* | Waste areas, riparian areas, roadsides, rangeland, and cropland. | Elko County, On-Site |
| Salt cedar (tamarisk)<br>*Tamarix spp* | Along streams, canals, reservoirs, floodplains, and riparian areas. | Elko County |
| Puncturevine<br>*Tribulus terrestris* | Disturbed areas, right-of-ways, and disturbed dry rangelands. | Elko County |
| **Other Non-Native, Invasive Plant Species[3]** | | |
| Jointed goatgrass<br>*Aegilops cylindrical* | Wheat fields, roadsides, waste areas, alfalfa fields, and pastures. | Elko County |
| Cheatgrass<br>*Bromus tectorum* | Wide range of habitats and environmental conditions. | On-Site |
| Spring thistle<br>*Cirsium vernale* | Found on barren, dry hillsides, often with pinyon-juniper or sagebrush. | Elko County |
| Bull thistle<br>*Cirsium vulgare* | Sunny, open areas that tolerate a wide range of conditions; typically found in disturbed areas. | Elko County, near Wells |
| Halogeton<br>*Halogeton glomeratus* | Disturbed sites, road sides and arid lands in poor ecological condition, highly saline soils | On-Site |
| Curly Dock<br>*Rumex crispus* | Pastures, hay fields, and crop fields; ideal conditions are wet areas with standing water. | Elko County |

[1] Creech et al., 2010; BLM, 1998.
[2] Creech et al., 2010; Elko County, 2008; HWA, 2012; Mulligan, 2012.
[3] Species were either documented during 2012 surveys (HWA, 2012), or have been identified within Elko County (Elko County, 2008).

### 3.3.1.2 Environmental Consequences

#### 3.3.1.2.1 Proposed Action Alternative

Surface disturbance, increased vehicle traffic, equipment placement and operation, foot traffic, and other activities could increase the distributions of established weed species and/or introduce new invasive species into areas that are not currently infested. Clearing native vegetation and exposing bare ground surfaces, especially within closed canopy big sagebrush shrub communities, allows invasive species, particularly annuals, to become established at the expense of perennial bunchgrasses (West, 1988).

Surface disturbance that is revegetated within one growing season of construction (generally in the fall) would be less likely to be infested by weeds than if left as exposed soil for longer periods. Noble would revegetate/reclaim disturbance resulting from road construction within one growing season after construction, which would minimize the potential for disturbed areas to be infested with invasive and noxious weeds.

Implementation of the measures provided in the Marys River Integrated Weed Management Plan (Appendix H) would minimize the spread or introduction of noxious weeds through prevention, monitoring, reclamation, and treatment. Integrated Weed Management would be the preferred treatment method if weed become established, this could include the use of herbicides (see Appendix H).

**Mitigation Measures**

The BLM has identified the following mitigation measures to further reduce effects from invasive, non-native species:

- Noble should implement measures described in the Marys River Integrated Weed Management Plan (Appendix H) to further reduce effects from invasive, non-native species and noxious weeds.

#### 3.3.1.2.2 No Action Alternative

Under the No Action Alternative, impacts from invasive species associated with either the Proposed Action Alternative or the Visual Alternative in the Project Area would not occur.

#### 3.3.1.2.3 Visual Alternative

Effects resulting from invasive non-native species under the Visual Alternative would be the same as those described above for the Proposed Action.

### 3.3.1.3 Cumulative Effects

Cumulative effects within the CESA that could increase invasive, non-native plants and noxious weeds include: wildland fire, mineral exploration, oil and gas exploration, dispersed recreation (i.e., hunting, camping, etc.), grazing, and off-highway vehicle (OHV) use. These effects would continue under the No Action Alternative. Invasive species such as cheatgrass and halogeton could continue to proliferate in the Project Area. Infestations of invasive species could continue to limit the establishment of native perennial vegetation, decrease forage availability, and increase risk of frequent high intensity rangeland fires. Implementation of the design features and environmental protection measures would minimize the likelihood of the Proposed Action or Visual Alternative spreading or introducing invasive species/noxious weeds within the Project Area and watershed; therefore, no incremental increase in cumulative effects are expected to occur over what is already occurring.

### 3.3.2 VEGETATION

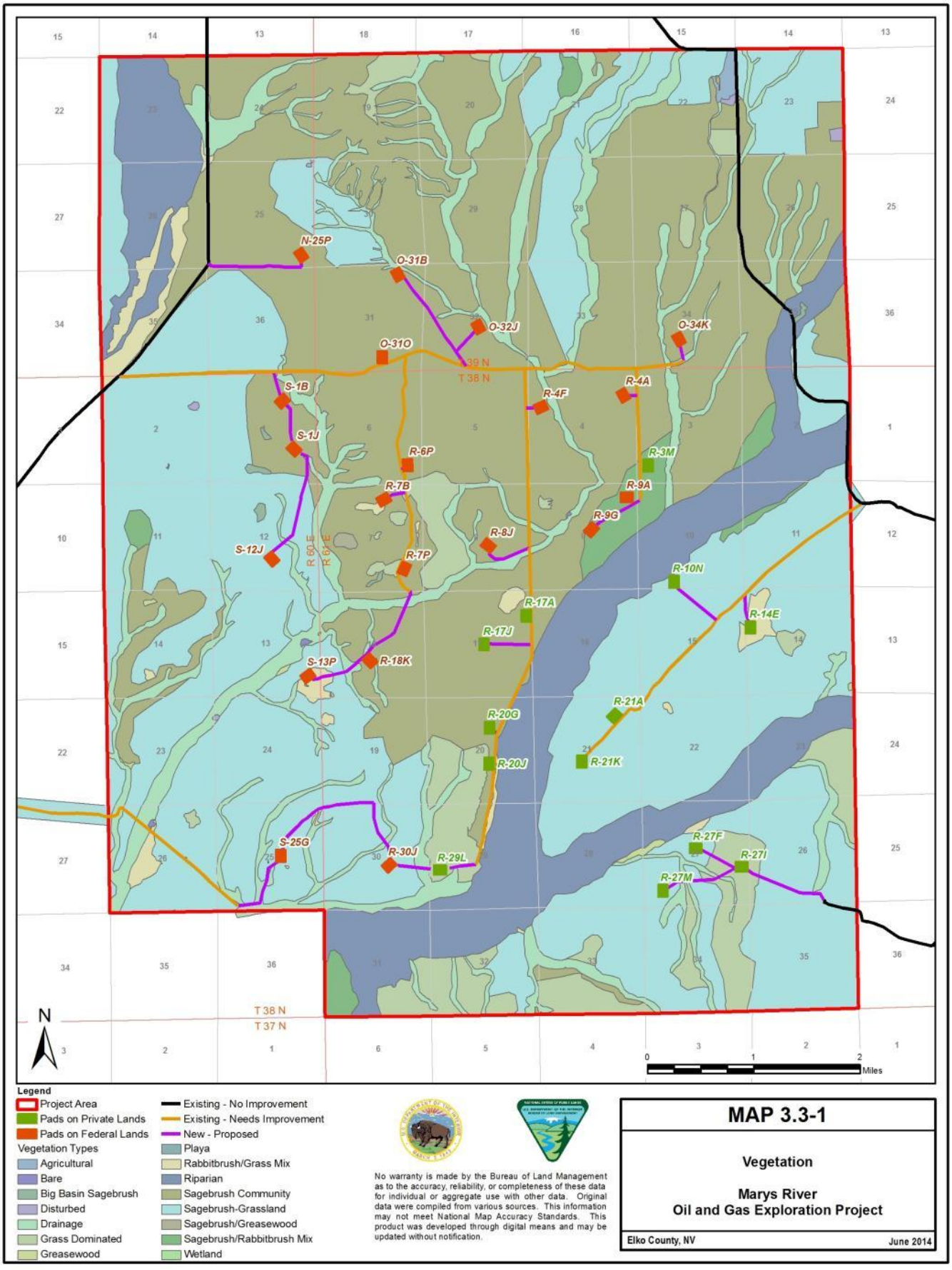
#### 3.3.2.1 Current Conditions

Elevations within the Project Area range from 5,300 to 5,700 feet; and topography is relatively flat with rolling hills, many drainages, hilltops, draws, and eroded hillsides. Vegetation community classifications in the Project Area follow standards developed by the Southwest Regional Gap Analysis Project (Lowry et al., 2005). Vegetation in the Project Area is affected by livestock grazing, vehicle use, wildland fire, and any activity which disturbs the ground surface as well as natural conditions and occurrences such as wildland fire, climatic variability, weather events, and climate change. Vegetation was mapped on-site with component descriptions provided by HWA (2012). Species' common and scientific names used in the text and tables are provided in Appendix M. Vegetation types within the Project Area fall within four broad categories: Shrubland, Grasslands, Riparian-Drainages, and Agriculture. These are further divided into Gap cover types and into mapped sup-types as detailed in Table 3.3-2 (see Map 3.3-1).

**Table 3.3-2**
**Vegetation Types, General Characteristics, and Locations within the Project Area**

| General Vegetation Type | Gap Cover Type [1] | Mapped Sub-Types [2] | Characteristics [2, 3] | General Location | Area (acres) |
|---|---|---|---|---|---|
| Shrubland | Inter-Mountain Basins Big Sagebrush Shrubland | Sagebrush Community | Shrub cover 10-30% | Large areas covered, mostly central and northern Project Area. | 13,647 |
| | | Sagebrush-Rabbitbrush | Shrub cover 10-20% | Mostly adjacent to riparian areas along Bishop Creek, Humboldt River. | 592 |
| | | Sagebrush-Grassland | Shrub cover 5% | Large areas covered, mostly in western and southern Project Area. | 14,820 |
| | | Rabbitbrush-Grassland | Shrub cover 10-20% | Scattered patches, mostly associated with riparian-drainages. | 499 |
| | Inter-Mountain Basins Greasewood Flat | Greasewood | Shrub cover 5-15% | Several small patches adjacent to riparian-drainages. | 26 |
| Grassland | Invasive Annual Grassland | Grassland | Shrub cover <5% | Mostly in southern half; upland sites, on low hillsides, hilltops. | 1,944 |
| | | Disturbed | Surface disturbance | Small sites, mostly north half. | 24 |
| | | Bare ground | Heavily grazed | Three sites along tributary to Tabor Creek. | 6 |
| | Inter-Mountain Basins Playa | Playa | Depression, dry or wet | Three playas in Project Area. | <0.5 |
| Riparian-Drainage | Great Basin Foothill Riparian Woodland and Shrubland | Riparian | Bordering perennial streams | Bordering Humboldt River, Bishop Creek, Tabor Creek. | 4,392 |
| | | Drainage | Bottom land with shrub cover 10-30% | Bordering multiple intermittent tributaries to perennial streams. | 3,451 |
| Agriculture | Agriculture | Agriculture | Irrigated/fallow | One location, northeast Project Area. | 43 |
| | | | | **TOTAL** | **39,444** |

[1] Lowry et al., 2005; NatureServe, 2004.
[2] HWA, 2012.
[3] Edge Environmental, 2012.




**Legend**

- Project Area
- Pads on Private Lands
- Pads on Federal Lands

Vegetation Types

- Agricultural
- Bare
- Big Basin Sagebrush
- Disturbed
- Drainage
- Grass Dominated
- Greasewood
- Playa
- Rabbitbrush/Grass Mix
- Riparian
- Sagebrush Community
- Sagebrush-Grassland
- Sagebrush/Greasewood
- Sagebrush/Rabbitbrush Mix
- Wetland

- Existing - No Improvement
- Existing - Needs Improvement
- New - Proposed

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

## MAP 3.3-1

**Vegetation**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014

Vegetation is dominated by big sagebrush communities that vary by associated shrub species components and amounts of vegetative cover provided by shrubs (see Table 3.3-2). The Inter-Mountain Basins Big Sagebrush Shrubland dominates the Project Area, with Wyoming big sagebrush as the dominant species, usually in association with rubber rabbitbrush, and Douglas or green rabbitbrush. Big sagebrush shrubland covers approximately 74 percent of the Project Area (HWA, 2012). Black greasewood is a shrub type generally associated with various drainages and riparian vegetation. It often forms a monotypic cover type on alluvial flats, terraces, and along drainages, but is limited within the Project Area. Greasewood is also a shrub component within the big sagebrush and other types of shrubland.

Antelope bitterbrush and threetip sagebrush are often shrub associates with big sagebrush in the Great Basin, but were not reported in the Project Area. Hood's phlox was found in the understory of sagebrush-dominated vegetation along with native grasses including bluebunch wheatgrass and western wheatgrass (HWA, 2012). Other native grasses that are generally associated with sagebrush-dominated vegetation include Indian ricegrass, thickspike wheatgrass, needle-and-thread, and Sandberg bluegrass (NatureServe, 2004). Two non-native grasses, crested wheatgrass and cheatgrass are extensive within most vegetation types across the Project Area (HWA, 2012).

A portion of the Project Area was mapped as riparian vegetation, utilized as irrigated hay fields and pastures, including areas along the Humboldt River, Bishop Creek, Burnt Creek, and Tabor Creek. Typical riparian vegetation, such as willows and sedges were reported, as well as non-native crested wheatgrass and invasive Canada thistle (HWA, 2012). Other native species such as narrowleaf willow, arroyo willow, rushes, slender wheatgrass, and Rocky Mountain iris are likely to occur in Great Basin riparian shrubland (NatureServe, 2004).

Numerous ephemeral drainages occur in the Project Area, although vegetation in the drainages is generally dominated by the same species that are found on adjacent upland sites. The amount of shrub cover in Drainage vegetation appears to be similar to shrub cover in Sagebrush Community and Rabbitbrush-Grassland vegetation types and was estimated to range between 10 and 30 percent (see Table 3.3-2) during on-site reconnaissance (HWA, 2012).

#### 3.3.2.2 Environmental Consequences

##### 3.3.2.2.1 Proposed Action Alternative

The Proposed Action (based on identified potential disturbance for 33 well pads – 381.8 acres) would remove the greatest amount of vegetation in the sagebrush community, and the sagebrush grassland community (see Table 3.3-3). Most effects to big sagebrush would be in habitats with the most sagebrush shrub cover (with a range of 10 to 30 percent shrub cover).

Damage or mortality to individual plants as a result of decreased light transmission due to dust deposited directly on leaves or other photosynthetic surfaces could occur due to increased traffic along existing roads during construction and operation. Noble would control fugitive dust on the access roads and within disturbed surfaces during construction which would minimize effects to adjacent vegetation. Additionally, speed limits would be enforced from the beginning of construction throughout the life of the Project, and where speed limits are not posted on unpaved access roads, speeds would not exceed 20 mph, which would minimize fugitive dust.

**Table 3.3-3**
**Maximum Effects to Vegetation Types in the Project Area under the Proposed Action (33 Well Pads)**

| Vegetation Types | Shrub Cover Characteristics | Vegetation in Project Area | | Potential Maximum Surface Disturbance (33 well pads) | |
|---|---|---|---|---|---|
| | | Total Area (acres) | Percent | Total (acres) | Percent |
| Sagebrush Community | Shrub cover 10-30% | 13,647 | 34.6 | 189.5 | 49.7 |
| Sagebrush-Rabbitbrush | Shrub cover 10-20% | 592 | 1.5 | 24.5 | 6.4 |
| Sagebrush-Grassland | Shrub cover 5% | 14,820 | 37.6 | 119.8 | 31.4 |
| Rabbitbrush-Grassland | Shrub cover 10-20% | 499 | 1.3 | 10.6 | 2.8 |
| Greasewood | Shrub cover 5-15% | 26 | 0.1 | 0.0 | 0.0 |
| Grassland | Shrub cover <5% | 1,944 | 4.9 | 24.6 | 6.4 |
| Disturbed | None | 24 | 0.1 | 0.0 | 0.0 |
| Bare ground | None | 6 | <0.1 | 0.0 | 0.0 |
| Playa | None | <0.5 | <0.1 | <0.01 | 0.0 |
| Riparian | Not Defined | 4,392 | 11.1 | 0.2 | <0.1 |
| Drainage | Assumed shrub cover 10-30% | 3,451 | 8.7 | 12.6 | 3.3 |
| Agriculture | None | 43 | 0.1 | 0.0 | 0.0 |
| **TOTAL** | | **39,444** | **100.0** | **381.8** | **100.0** |

Herbivores could be attracted to unaffected vegetation adjacent to newly revegetated locations, causing excessive browsing and/or grazing following restoration. This impact could be minimized by fencing highly vulnerable areas until reclamation is successful. Indirect effects to native vegetation could occur if invasive, non-native species became established in cleared, disturbed areas and resulted in infestations that might limit or prohibit growth of native and/or desirable species. Weed seeds or cuttings of some species could be transported naturally (wind and water) or accidentally (vehicles or other equipment) to disturbed areas. Weed seeds may be present in the native soil materials and the removal of vegetative cover and soil disturbance might promote weed establishment at the expense of desirable species. Noble would initiate reclamation on temporary disturbances associated with roads within at least one growing season of ground disturbance, which would minimize disturbed substrate availability for invasive and noxious weed establishment.

Sagebrush communities would be improved with implementation of the Greater Sage-Grouse Management Plan (Appendix K) as discussed in Section 3.3.4, Special Status Species.

**Mitigation Measures**

The BLM has identified the following mitigation measure to further mitigate potential impacts to vegetation resources:

- Exclusion fencing should be erected along revegetated disturbance in highly vulnerable areas to exclude livestock, accelerate reclamation of surface disturbances, and minimize weed infestations, and should be maintained until monitoring has determined that reclamation is successful. The BLM AO should determine areas for potential exclusion.

- Noble should implement measures described in the Marys River Reclamation Plan (Appendix G).

#### 3.3.2.2.2 No Action Alternative

Under the No Action Alternative, there would be no impacts from either the Proposed Action Alternative or the Visual Alternative to vegetation within the Project Area.

#### 3.3.2.2.3 Visual Alternative

Effects to vegetation under the Visual Alternative would be similar to those described above for the Proposed Action.

The Visual Alternative (based on identified potential disturbance for 27 well pads – 309.3 acres) would have the greatest effects on the sagebrush community, and the sagebrush grassland community (see Table 3.3-4). Most effects to big sagebrush would be in habitats with the most sagebrush shrub cover (with a range of 10 to 30 percent shrub cover).

**Table 3.3-4**
**Maximum Effects to Vegetation Types in the Project Area under the Visual Alternative (27 Well Pads)**

| Vegetation Types | Shrub Cover Characteristics | Vegetation in Project Area | | Vegetation Impacts from 27 well pads | |
|---|---|---|---|---|---|
| | | Total Area (acres) | Percent | Total (acres) | Percent |
| Sagebrush Community | Shrub cover 10-30% | 13,647 | 34.6 | 190.5 | 61.6 |
| Sagebrush-Rabbitbrush | Shrub cover 10-20% | 592 | 1.5 | 24.5 | 7.7 |
| Sagebrush-Grassland | Shrub cover 5% | 14,820 | 37.6 | 56.5 | 18.4 |
| Rabbitbrush-Grassland | Shrub cover 10-20% | 499 | 1.3 | 10.6 | 3.4 |
| Greasewood | Shrub cover 5-15% | 26 | 0.1 | 0.0 | 0.0 |
| Grassland | Shrub cover <5% | 1,944 | 4.9 | 14.9 | 4.8 |
| Disturbed | None | 24 | 0.1 | 0.0 | 0.0 |
| Bare ground | None | 6 | <0.1 | 0.0 | 0.0 |
| Playa | None | <0.5 | <0.1 | 0.0 | 0.0 |
| Riparian | Not Defined | 4,392 | 11.1 | 0.1 | 0.0 |
| Drainage | Assumed shrub cover 10-30% | 3,451 | 8.7 | 12.2 | 3.9 |
| Agriculture | None | 43 | 0.1 | 0.0 | 0.0 |
| **TOTAL** | | **39,444** | **100.0** | **309.3** | **100.0** |

### 3.3.2.3 Cumulative Effects

Cumulative effects that could impact vegetation within the CESA include: wildland fire, oil and gas exploration, dispersed recreation (i.e., hunting, camping, etc.), grazing, increased invasive and noxious weed presence, and OHV use. These effects would continue under the No Action Alternative. Within the CESA (see Map 3.1-1), both the Proposed Action Alternative and the Visual Alternative would add to the cumulative effects already occurring due to other forms of multiple use. With implementation of mitigation measures described above, and greater sage-grouse compensatory mitigation, cumulative impacts resulting from either the Proposed Action Alternative or the Visual Alternative would be minimized.

### 3.3.3 MIGRATORY BIRDS

#### 3.3.3.1 Current Conditions

The Migratory Bird Treaty Act (MBTA) of 1918, as amended, implements treaties for the protection of migratory birds. The MBTA includes all birds listed in 50 CFR 10.13 and includes both raptors and passerines. An Executive Order issued in 2001, EO 13186, directed actions that would further implement the MBTA. As required by the MBTA and EO 13186, the BLM signed a MOU with the U.S. Fish and Wildlife Service (USFWS) in April 2010, which is intended to strengthen migratory bird conservation efforts by identifying and implementing strategies to promote conservation and reduce or eliminate adverse impacts on migratory birds.

The BLM's conservation efforts focus on migratory species and some non-migratory game bird species that are listed as Birds of Conservation Concern (BCC). BCC have been identified by the USFWS (2008) for different Bird Conservation Regions (BCR) in the United States. The entire Project Area is in BCR 9, the Great Basin region.

Thirty-one bird species were observed during on-site surveys in 2012 (HWA, 2012), of which five were BCC (see Table 3.3-5 and Appendix N). Two other BCC, the loggerhead shrike and ferruginous hawk, are likely to occur in the Project Area. Long-term data (1966 to 2010) indicate populations are neither increasing nor decreasing within BCR 9 for the seven BCC species (Sauer et al., 2011) included in Table 3.3-5. Data compiled for 12 National Biological Survey Breeding Bird Survey (BBS) routes (Sauer et al., 2011) within a 100-mile area surrounding the Project Area reveal that local populations of sage thrashers, Brewer's sparrows, and Sagebrush sparrows have been decreasing during the past 20 years; 1992 to 2011 (see Table 3.3-5 and Appendix N). Those three BCC species were observed within the Project Area (HWA, 2012).

**Table 3.3-5**
**Birds of Conservation Concern within Bird Conservation Region 9 (Great Basin) that May Occur in the Project Area**

| Common Name<br>Scientific Name | Habitat [1] | Observed On-site [2] | BCR Trend [3] 1966 to 2011 | Local Trend [4] 1992 to 2011 |
|---|---|---|---|---|
| Ferruginous hawk<br>*Buteo regalis* | Nests in isolated trees, rock outcrops, artificial structures, and ground near prey base. | No | No Trend | Insufficient Data |
| Golden eagle<br>*Aquila chrysaetos* | Nests on open cliffs and in canyons or in tall trees (cottonwoods) in open country and riparian zones. | Yes | No Trend | Insufficient Data |
| Long-billed curlew<br>*Numenius americanus* | Nests in grassy areas close to marshes but also dry upland areas, alkali flats. | Yes | No Trend | No Trend |
| Loggerhead shrike<br>*Lanius ludovicianus* | Present in desert shrublands, juniper woodlands; hunts over bare ground or short vegetation. | No | No Trend | Insufficient Data |
| Sage thrasher<br>*Oreoscoptes montanus* | Valleys, foothills, mesas in big sagebrush shrublands; nests in shrub or ground beneath shrub. | Yes | No Trend | Declining |
| Brewer's sparrow<br>*Spizella breweri* | Closely associated with big sagebrush shrublands; nests in sagebrush, forages on ground. | Yes | No Trend | Declining |
| Sagebrush sparrow<br>*Amphispiza belli* | Closely associated with big sagebrush shrublands; nests in shrub close to ground, forages on ground. | Yes | No Trend | Declining |

[1] Based on Righter et al., 2004; Ryser, 1985.
[2] HWA, 2012.
[3] Sauer et al., 2011.
[4] Linear trends of birds counted per route, averaged for data available on 12 BBS routes within 100 miles surrounding the Project Area in Nevada, Idaho, and Utah between 1992 and 2011.

A total of 177 bird species, listed as Nearctic and Neotropical migratory birds by the USFWS, Division of Bird Habitat Conservation, and protected under the MBTA (USFWS, 2010a), have been observed on 12 BBS routes within 100 miles of the Project Area in Nevada, Idaho, and Utah (see Appendix N). Some species have been observed on a few occasions and other species are common. Trends for eight species during the past 20 years indicate their populations are decreasing, while populations for 15 species appear to be increasing. Western meadowlark, Sagebrush sparrow, Brewer's sparrow, and sage thrasher are species that were observed on-site and have declining populations in the Project Area and vicinity. Alternatively, Canada goose, turkey vulture, red-tail hawk, black billed magpie, American robin, and red-winged blackbird are species with increasing populations in the surrounding area and were observed on-site (HWA, 2012).

#### 3.3.3.2 Environmental Consequences

##### 3.3.3.2.1 Proposed Action Alternative

The USFWS has primary responsibility for administering the MBTA, which prohibits taking, killing, or possessing migratory birds, their parts (feathers, talons), nests or eggs. According to EO 13186 directed federal agencies (including the BLM) to avoid take under the MBTA, whether intentional or unintentional (with BCC as priorities), and to implement conservation measures to restore and enhance habitat for migratory birds. Conservation measures include the development of surface operating standards for oil and gas developments, management of invasive species to benefit migratory birds, minimizing/preventing pollution, or detrimental alteration of habitats utilized by migratory birds, among other commitments.

Disturbance during the nesting season could result in nest abandonment, displacement of birds, and possible mortality of nestlings, most likely early in the nesting season (egg laying, incubation) rather than late in the season (Romin and Muck, 2002). Most species will re-nest following a nesting failure although the number of nesting attempts or re-nesting intensity varies among species (Marten and Geupel, 1993). However, it should be noted that "taking an individual, nest, or eggs of a migratory bird is unlawful under the MBTA, whether or not the species will re-nest. Risk of mortality of nestlings and dependent fledglings is greater if adults abandon nests late in the season or nests are destroyed prior to fledging young, and could increase if predators are attracted to areas occupied by humans (Andren, 1994; Chalfoun et al., 2002).

Displacement of nesting migratory birds from adjacent nesting habitats due to noise, human activity, and dust associated with oil and gas activities could also occur (Ingelfinger and Anderson, 2004; Knick and Rotenberry, 2002) within a "zone of effect" surrounding Project components including well pads (including production facilities) and roads. Displacement/avoidance may be short-term if related to noise and human presence and may be long-term if related to habitat removal, alteration, and/or fragmentation (Gilbert and Chalfoun, 2011).

The Proposed Action could affect bird species through degradation of nesting habitats due to invasive and noxious weed infestations that could alter native vegetation cover and plant species composition. Implementation of the Marys River Integrated Weed Management Plan (Appendix H) would minimize weed infestations.

Bird species are susceptible to potential collisions with Project vehicles along the Project access roads and the highways leading to the area. Maintaining vehicle speeds of 20 mph or less or Project roads would reduce the potential for potential collisions. The use of on-site accommodations during drilling would also reduce traffic in the Project Area, further reducing the potential for collisions.

Mortality of adult birds can potentially occur if they select hollow metal and plastic pipes (PVC – polyvinyl chloride), or posts to nest in and become trapped (BLM, 2013). Mortality can also occur if birds use exhaust stacks on production facilities to perch, roost, or nest and become trapped, poisoned by carbon monoxide, or incinerated (BLM, 2013). As included in the BBCS (JBR, 2013b), all open pipes would be capped or filled to prevent birds from becoming trapped and all exhaust stacks would be screened and outfitted with anti-perching devices to prevent bird entry and to discourage perching, roosting, and nesting. Caps and screens would be checked regularly to ensure they are effective. Noble is proposing to use closed loop drilling systems that would eliminate the use of reserve pits, reducing the threat of poisoning by drilling fluids in reserve pits.

The 2010 MOU between the BLM and USFWS identifies strategies to promote conservation and reduce or eliminate adverse impacts on migratory birds.

At the project level, the BLM should:

- Evaluate the effects of their actions on migratory birds and identify where take reasonably attributable to those actions may have a measureable negative effect on migratory bird populations;
- Develop conservation measures and ensure monitoring or the effectiveness of the measures to minimize, reduce or avoid unintentional take; and
- Consider approaches to the extent practicable for identifying and minimizing take that is incidental to otherwise lawful activities including:

    - altering the season of activities to minimize disturbances during the breeding season,
    - retaining the integrity of breeding sites, especially those with long histories of use, and
    - coordinating with the USFWS when planning projects that are likely to have a negative effect on migratory bird populations and cooperating in developing approaches that minimize negative impacts and maximize benefits to migratory birds.

Effects to migratory birds could result from one or more of the following:

- Removal of nesting and foraging habitat during the primary nesting season (March 15 – July 31);
- Active nest abandonment and nestling mortality resulting from disturbances (noise, human activity);
- Permanent or long-term loss of shrub cover reducing nesting cover and substrate for birds;
- Degradation of nesting habitats due to invasive and noxious weed infestations that could alter native vegetation cover and plant species composition;
- Collisions with Project vehicles along Project access roads as well as highways leading to the area; and
- Poisoning resulting from the ingestion of toxic chemicals.

Noble has prepared a BBCS (JBR, 2013b) with the following goals:

- Reduce the potential for avian and bat injury or mortality by implementing specific actions;
- Identify and isolate where avian and bat mortality has occurred or has the potential to occur to minimize future incidents;
- Establish an avian and bat reporting system to document incidents of mortality caused by electrocution, heat, collision, and other Project-related features; and

- Assist Noble in compliance with state and federal laws regarding avian and bat species to avoid the threat of penalties and fines.

The measures included in the BBCS and the above discussion of effects are listed in Section 2.2.1.6 (Project Design Features). With implementation of the measures in the BBCS, effects to migratory birds would be minimized.

**Passerine Migratory Birds**

In the 2010 MOU, BLM committed to identify where take under the MBTA could be reasonably attributable to agency actions that could have a measurable negative effect on migratory bird populations, focusing first on species of concern, priority habitats, and key risk factors. Avoidance implementing actions during nesting seasons is one approach to lessening take. The BLM suggested that impacts to nesting migratory birds could be minimized or avoided by imposing a timing limitation on use authorizations to mitigate vegetative disturbing activities during the primary portion of the nesting season (March 15 to July 31) when most species of migratory birds nest, but cautioned that dates should be adjusted for the timing or intensity of breeding activity by BCC and migratory bird species affected by the Project, and adjusted for environmental conditions (BLM, 2007a). As discussed in the BBCS (JBR, 2013b) and in accordance with BLM Elko District policy, if ground disturbing activities or brush removal occur during the nesting season, clearance surveys are to occur in the disturbance area including a 300-ft buffer. Surveys must be conducted a maximum of 2 weeks prior to disturbance and are then adequate for a maximum of 2 weeks. Additional surveys will need to be repeated after 2 weeks have elapsed if proposed activities have not been initiated. If active nests are found, proposed activities would not occur until after young have fledged, nests are abandoned, or after the nesting season ends unless a 300-ft buffer can be provided around nests. Buffered nests need to be tied to contiguous habitat and not left as islands within Project Areas.

Brush removal prior to the primary nesting season (March 15) would discourage use of the Project Area for nesting, thereby reducing direct breeding season impacts. Nesting habitat would be altered and/or removed, and would affect local densities of breeding birds. Conducting surveys on proposed disturbance sites within two weeks prior to vegetation clearing during the nesting season would minimize potential take under MBTA, although impacts to nesting migratory birds could occur in adjacent habitats. If no nests or adult migratory birds are found within the surveyed area, vegetation clearing would be initiated. If active nests and/or adults displaying courtship and/or territorial behaviors are observed, vegetation clearing would not be initiated until young have fledged.

Noise produced by machinery and other human activities may interfere with bird vocalizations used for territory establishment, mate attraction and selection, food begging, and predator alarms (Marler, 2004). Use of reasonable, prudent, and effective measures such as using suitable mufflers on all internal combustion engines and restricting access to authorized personnel could also reduce potential impacts to migratory birds. Incidental disturbance to active nests, if it occurs, is not expected to have measurable negative effects on migratory bird populations.

Long-term loss of shrub cover could reduce nesting cover and substrate for birds, especially for sagebrush and shrub-nesting obligates such as the BCC and other passerine species noted above. Other migratory birds nest on the ground, often near or within clumps of grass (e.g., horned lark, savannah sparrow, vesper sparrow, western meadowlark). As described in Section 3.3.2 (Vegetation), an identified potential disturbance of 381.8 acres of vegetation (including big sagebrush) has been identified for 33 potential well pad locations and associated access roads (although no more than 20 well pads would be constructed). These habitats are expected to support nesting by BCC and other migratory birds that have been observed in the Project Area. Successful revegetation is expected to occur within three growing seasons of construction,

which should provide nesting and/or foraging habitat for some passerine migratory species; however, reestablishment of sagebrush would be longer. Under natural succession regimes it would take at least 20 years to replace a mature sagebrush stand.

**Raptor Migratory Birds**

Disturbance (noise, human activities) to nesting raptors can lead to nest abandonment and nestling mortality (Romin and Muck, 2002). Impacts to raptors are similar to those identified for passerine birds described above. Adherence to seasonal and spatial buffers would minimize impacts to nesting raptors.

**Mitigation Measures**

In addition to the Project Design Features (see Section 2.2.1.6), the BLM has identified the following Mitigation Measures to further reduce potential impact to migratory birds:

- Raptor and corvid perching and nesting deterrents should be placed on all aboveground structures to reduce potential predation on migratory birds and their nestling, including BCC.
- Highly visible markers should be placed on fence wires to reduce sage-grouse collisions with fences. Locations requiring flight deterrent markers, and marker types would be identified by BLM-approved biologists.
- There should be no disturbance activity within the following seasonal and spatial buffers for raptor migratory birds.

| Species | Seasonal Buffer[1] | Spatial Buffer[1] (mile) |
|---|---|---|
| Turkey Vulture[4] | March 1[2] – August 15 | 0.5 |
| Osprey | April 1 – August 31 | 0.5 |
| Northern Harrier[4] | April 1 – August 15 | 0.5 |
| Golden Eagle[4] | January 1 – August 31 | 0.5 |
| Bald Eagle[4] | January 1 – August 31 | 1.0 |
| Northern Goshawk | March 1 – August 15 | 0.5 |
| Cooper's Hawk | March 15 – August 31 | 0.5 |
| Sharp-shinned Hawk | March 15 – August 31 | 0.5 |
| Red-tailed Hawk[4] | March 15 – August 15 | 0.5 |
| Swainson's Hawk | March 1 – August 31 | 0.5 |
| Ferruginous Hawk | March 1 – August 1 | 0.5 |
| American Kestrel[4] | April 1 – August 15 | 0.125[3] |
| Merlin | April 1 – August 31 | 0.5 |
| Prairie Falcon[4] | April 1 – August 31 | 0.25 |
| Peregrine Falcon | February 1 – August 31 | 1.0 |
| Barn Owl | February 1 – September 15 | 0.125[3] |
| Long-eared Owl | February 1 –August 15 | 0.25 |
| Short-eared Owl[4] | March 1 – August 1 | 0.25 |
| Flammulated Owl | April 1 – September 30 | 0.25 |
| Western Screech-owl | March 1 – August 15 | 0.25 |
| Great Horned Owl[4] | December 1 – September 30 | 0.25 |
| Northern Pygmy Owl | April 1 – August 1 | 0.25 |
| Burrowing Owl[4] | March 1 – August 31 | 0.25 |
| Northern Saw-whet Owl | March 1 – August 31 | 0.25 |

[1] Romin and Muck. 2002.
[2].Herron et al., 1985.
[3] Romin and Muck (2002) did not recommend a specific spatial buffer due to apparent high population densities and ability to adapt to human activity However, Elko BLM recommends a spatial buffer because of the remote nature of many raptor nest sites in Nevada and the likelihood that they would not be conditioned to human activities.
[4] Species observed in the Project Area (HWA, 2012).

- If vegetation clearing is planned during the primary nesting period (March 15 through July 31), surveys should be conducted. If nests are found within areas where vegetation would be removed, surface disturbances should not occur until after July 31. If no nests are found, clearing would be possible with no timing limitation if conducted within 14 days of the survey.
- There should be no disturbance activity within 300 feet of passerine migratory bird nests from March 15 through July 31. This was established in the 2014 Draft BLM Nevada Statewide Wildlife Survey Protocols and is consistent with the BBCS.

#### 3.3.3.2.2 No Action Alternative

Under the No Action Alternative, there would be no change from either the Proposed Action Alternative or the Visual Alternative to habitats used for nesting and shelter by BCC and other migratory birds within the Project Area.

#### 3.3.3.2.3 Visual Alternative

Effects to Migratory Birds under the Visual Alternative would be similar to those described above for the Proposed Action. An identified potential disturbance of 309.3 acres of vegetation has been identified for potential disturbance (27 well pads and associated access roads); however, no more than 20 of the 27 identified well pads would be constructed resulting in a maximum disturbance of 276.5 acres.

### 3.3.3.3 Cumulative Effects

Cumulative effects to migratory birds are discussed in Section 3.3.5.3/Cumulative Effects.

## 3.3.4 SPECIAL STATUS SPECIES

### 3.3.4.1 Current Conditions

#### 3.3.4.1.1 ESA-Listed Species and Proposed Species

Under the Endangered Species Act (ESA), species may have several different levels of status. Endangered species are species that are imperiled, the threat of extinction is imminent. Threatened species are species in threat of becoming endangered. Proposed species are species for which a decision to list has been made but the actual listing has not yet happened. These three status afford species protections and require consultation with the USFWS on all major federal construction activities unless there is a determination of “no effect.” The USFWS (2012a) identified four species listed as threatened or endangered under the ESA as occurring within Elko County. They include the endangered Clover Valley speckled dace, endangered Independence Valley speckled dace, threatened bull trout in the Jarbidge River Distinct Population Segment (DPS), and threatened Lahontan cutthroat trout. There is one species proposed for listing as threatened (yellow-billed cuckoo, western United States DPS), that could occur within the Project Area. The species listed in Table 3.3-6 are not carried forward in the analysis for the reasons discussed.

**Table 3.3-6**
**ESA Species Not Carried Forward in the Analysis**

| Species | Species Present | Habitat Present | Comments |
|---|---|---|---|
| Clover valley speckled dace | No | No | The Clover Valley speckled dace is limited to three springs and outflows in the Clover Valley, also in Elko County (USFWS, 1998). |
| Independence valley speckled dace | No | No | Currently, the Independence Valley speckled dace is found in two reservoirs that impound flows from Independence Valley Warm Springs (USFWS, 1998). |
| Bull trout | No | No | There is no hydrologic surface connection to the Humboldt River and the species is not expected in the Project Area. |
| | | | |
| Yellow-billed cuckoo | No | No | Yellow-billed cuckoos are considered a riparian-obligate species and are usually found in large tracts of cottonwood/willow habitats with dense sub-canopies, but may also be found in urban areas with tall trees (USFWS, 2007). |

**Lahontan Cutthroat Trout.** The Lahontan cutthroat trout was first listed as endangered in 1970 but reclassified as threatened in 1975 (USFWS, 1975). The species inhabits the Marys River subbasin, which is included in the species' recovery plan (FWS, 1995). In 2004, there were 14 streams in which Lahontan cutthroat trout had been established for 5 years or more (see Appendix D, Elliot, 2004). As of 1997, Hanks Creek was inhabited and was the farthest downstream tributary in the Marys River subbasin Priority Metapopulation Recovery Area, primarily on BLM-administered land (see Map 2, Elliot, 2004; Pahl, 2010). The confluence of Hanks Creek and Marys River is approximately 30 straight-line miles to the confluence of Marys River and the Humboldt River near Deeth. FWS (2014) noted subpopulations in Sherman Creek and Jackstone Creek, both of which are tributaries to the Humboldt River but are 30 straight-line miles southwest from the Project Area. The USFWS (2014) noted that the Humboldt River could connect subpopulations where suitable habitat is present, similar to potential connectivity provided by the Marys River for isolated populations in its tributaries.

Optimal habitat includes clear, cold water with an average summer temperature of less than 72$^{o}$F and a relatively stable summer temperature regime averaging 55$^{o}$F (USFWS, 1995). Water temperatures above 75 to 77$^{o}$F are the upper chronic exposure limits for Lahontan cutthroat trout (Dickerson and Vinyard, 1999). July air temperatures of 18$^{o}$C (64$^{o}$F) as they influence on water temperatures restrict downstream distributions of Lahontan cutthroat trout (Keleher and Rahel, 1996; Rahel et al., 1996; Dunham et al., 1999). Although data are limited, water temperatures measured in the Marys River (Station HS1, 14 straight-line miles upstream from the confluence with the Humboldt River) since 1999 (NDEP, 2011) indicates average temperatures in July were 71$^{o}$F (68$^{o}$F in 2008; 74.5$^{o}$F in 2003), while average temperatures exceeded 55$^{o}$F from May through September. Marys River is currently on the 2012 list of impaired waterbodies because of low dissolved oxygen and water temperatures (NDEP, 2013c) that exceeded the standard of 20$^{o}$C (68$^{o}$F) for trout waters (see Nevada Administrative Code, Chapter 445A – Water Controls). During winter, ice formation prevents fish from inhabiting shallow waters and restricts movements; once Lahontan cutthroat trout enter suitable winter habitats such as beaver ponds or deep pools, they are likely to remain in place until spring runoff (Ambruzs, 2008). That pattern of restricted winter movements has been described for other cutthroat trout subspecies (Hilderbrand, 1998). High water temperatures may limit downstream distributions of Lahontan cutthroat trout (Dunham et al., 1999). It seems likely that Lahontan cutthroat trout would not move downstream in Marys River during the period of

warmer water temperatures and they are not expected to occur in Tabor Creek, Bishop Creek, or the Humboldt River within the Project Area.

USFWS (2014) reported that the Marys River Ranch was issued an Enhancement of Survival Permit based on their Application for a Safe Harbor Agreement (USFWS, 2012b). The Marys River Ranch proposed to habitat restoration, maintenance, or enhancement activities to facilitate the repatriation and recovery of Lahontan cutthroat within the enrolled property. The proposed duration of both the SHA and permit is 50 years (USFWS, 2012b). The Marys River Ranch is 14 straight-line miles upstream from the confluence of Marys River and Humboldt River.

#### 3.3.4.1.2 ESA Candidate Species

Candidate species are species that the USFWS has reviewed and found that listing is warranted but a decision to list is still pending. Species that have Candidate status do not have special protection under the ESA. There are three candidate species that could occur within the Project Area –the Columbia spotted frog, the greater sage-grouse, and the Goose Creek milkvetch.

**Columbia Spotted Frog.** Columbia spotted frogs were petitioned for listing under the ESA in 1989 and populations, including those in Nevada, were found to be declining due the extensive loss and alteration of wetland habitat. The USFWS (1993) found that listing the Great Basin DPS (and others) under the ESA was warranted but precluded by other priorities and designated the species as a candidate. The Jarbidge–Independence subpopulation of the Great Basin DPS is north of the Project Area, including watersheds in the Humboldt River Basin and extending into Idaho and the Snake River Basin (Columbia Spotted Frog Technical Team, 2003). The Marys River Conservation Unit is one of several in the Jarbidge–Independence subpopulation area. Though much of the Marys River System remains unsurveyed for Columbia spotted frogs, large numbers of frogs with potential for downstream dispersal into suitable habitats were found in 1998. Given the proximity of populations in Currant Creek to the Tabor Creek headwaters, potential for dispersal into suitable habitat exists. Presence of spotted frogs in Tabor Creek and the Project Area may be possible.

**Greater Sage-Grouse.** After a 12-month review, the USFWS (2010b) found that listing the greater sage-grouse as threatened or endangered under the ESA throughout its range was warranted but precluded by higher priority listing actions.

Greater sage-grouse historical habitat distribution data has been kept by the Nevada Department of Wildlife (NDOW). In March 2012, NDOW updated their greater sage-grouse habitat mapping to include five habitat categories. Habitats in Category 1 and 2 have the highest conservation value to maintaining sustainable greater sage-grouse populations (NDOW, 2012a). NDOW has not established management directives based on their habitat categorization; they promote the habitat categories as the best available information for use in planning and decision-making by land management agencies (NDOW, 2012a).

On March 15, 2012, the BLM issued a White Paper on greater sage-grouse habitat on lands managed by the BLM and the Forest Service (BLM, 2012b). The paper states that the BLM and the Forest Service will focus on two categories of greater sage-grouse habitat including PPH Preliminary Priority Habitat (PPH) and Preliminary General Habitat (PGH). Areas of PPH or PGH indicate where land-use changes could result in a negative impact to greater sage-grouse population health. BLM's classification of greater sage-grouse habitats in the Project Area is limited to federal land. The BLM (2012c) has classified PPH and PGH in the Project Area on public lands. The BLM used the NDOW Habitat Categories 1 through 3 to determine PPH and PGH habitat types as follows:

- PPH consists of NDOW Habitat Category 1 (Essential and Irreplaceable Habitat) and Category 2 (Important Habitat). The NDOW Habitat Categories consist of breeding habitat, lek sites, nesting habitat, brood-rearing habitat, winter range, and movement corridors. Habitat for greater sage-grouse primarily consists of sagebrush; however, it can include riparian areas, perennial grassland, agricultural land, and restored land.
- PGH consists of NDOW Habitat Category 3 (Moderate Importance). This habitat type is similar to PPH although it typically lacks one or more key components that prevent it from being categorized as primary habitat. For example, sagebrush and understory may be present yet of insufficient height. This habitat type also includes sagebrush communities with pinyon-juniper encroachment, unrecovered burn areas, and areas that lack bird survey and inventory data to support a higher ranking.
- NDOW Habitat Category 4 (Low Value Habitat and Transitional Range) consists of areas that contribute very little habitat value to greater sage-grouse other than transitional range from one seasonal habitat to another or minimal foraging use. These habitat types include salt desert shrub communities, natural pinyon/juniper woodlands, aspen stands, and mountain mahogany stands. BLM did not utilize this category.
- NDOW Habitat Category 5 (Unsuitable Habitat) consists of areas currently in such poor condition that restoration efforts would not be feasible. BLM did not utilize this category.

The majority of the Project Area is designated as BLM PPH (19,176.5 acres or 48.6 percent) which is also NDOW Habitat Category 1 and 2. BLM PGH (also NDOW Habitat Category 3) comprises 2,080.5 acres or 5.2 percent of the Project Area. The balance of the Project Area (18,187 acres or 46.2 percent) is NDOW Habitat Category 1, 2, and 3 on private lands or non-habitat (see Table 3.3-7).

The Project Area coincides with sage-grouse nesting and early brood-rearing habitat, late-brood rearing habitat, and winter habitat (see Map 3.3-2). Seasonal use characteristics follow:

- In Nevada, breeding and nesting habitats are occupied from March through May (BLM, 2000).
- Early brood-rearing habitat is used by female grouse with chicks for up to 3 weeks following hatching. Early brood-rearing habitat descriptions can be found in Connelly et al., 2010, the Nevada Energy Development Guidelines (Nevada Governor's Sage-grouse Conservation Team -NGSCT, 2010), and the NTT Report (Sage-grouse National Technical Team, 2011).
- Definition and use of late brood-rearing habitat is dependent on many factors including precipitation during spring and early summer and availability of forbs throughout the summer (NGSCT, 2010). In Nevada, brood-rearing habitats are used from April through August (BLM, 2000).
- Use of winter habitats depends on winter severity, but winter habitats are generally occupied from October through March (BLM, 2000).

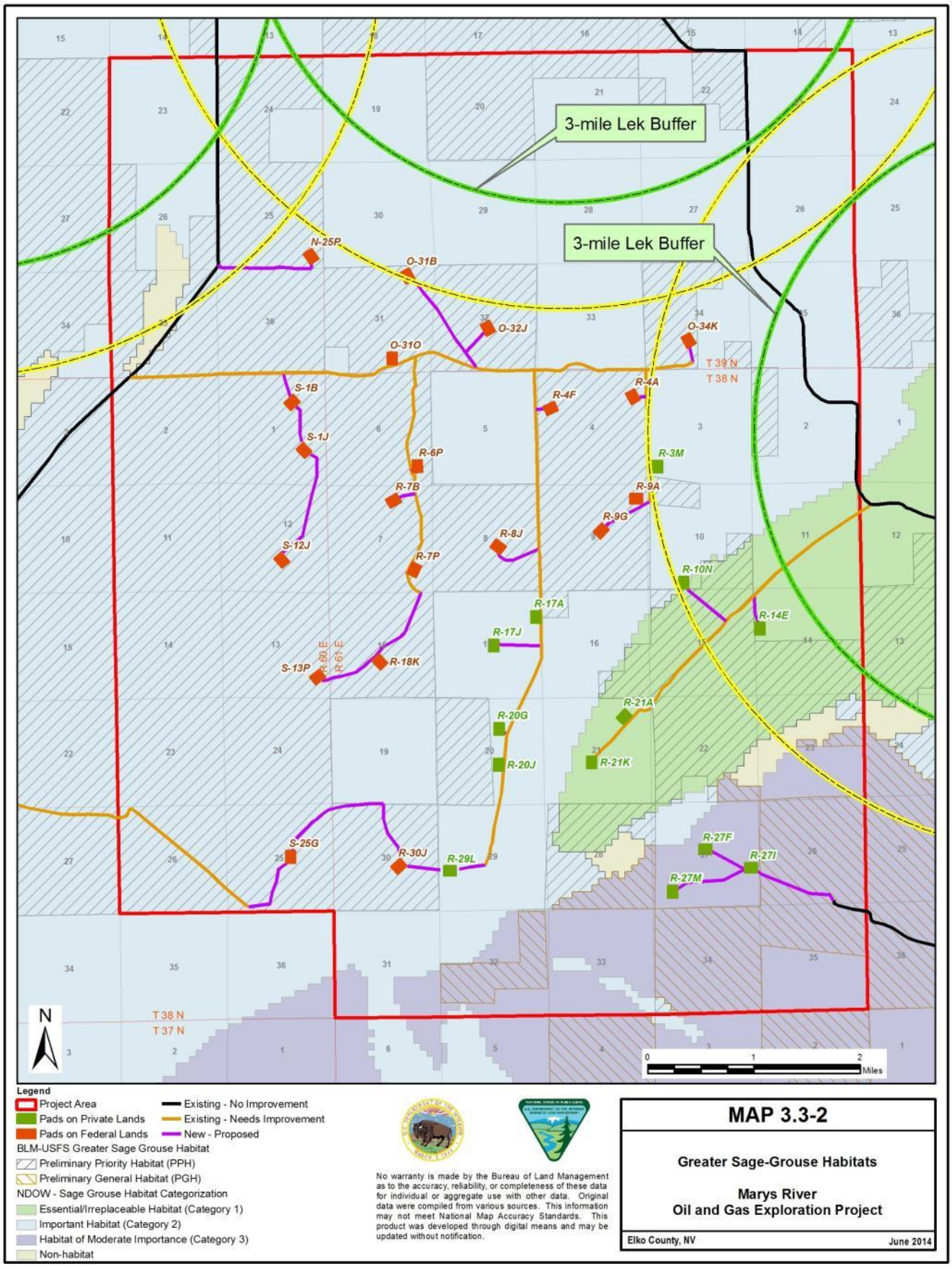
**Table 3.3-7**
**Vegetation Types in the Project Area within Sage-Grouse Habitat Categories**

| Mapped Vegetation | Shrub Cover Characteristics | BLM PPH (NDOW Categories 1 and 2) | BLM PGH (NDOW Category 3) |
|---|---|---|---|
| | | (acres) | |
| Sagebrush Community | Shrub cover 10-30% | 7,066.0 (13,583.1) | 2.9 (27.5) |
| Sagebrush-Rabbitbrush | Shrub cover 10-20% | 348.6 (513.7) | 0 (78.1) |
| Sagebrush-Grassland | Shrub cover 5% | 8,538.0 (12,330.2) | 1,356.0 (2,461.4) |
| Rabbitbrush-Grassland | Shrub cover 10-20% | 238.3 (388.9) | 1.4 (10.8) |
| Greasewood | Shrub cover 5-15% | 26.3 (29.6) | 4.3 (7.9) |
| Grassland | Shrub cover <5% | 447.0 (903.8) | 451.3 (1,038.4) |
| Disturbed | Not Defined | 12.5 (23.7) | 0 (0) |
| Bare Ground | None | 6.1 (6.1) | 0 (0) |
| Playa | Not Defined | 0.4 (0.4) | 0 (0) |
| Riparian | Not Defined | 473.3 (3,797.4) | 85.9 (252.0) |
| Drainage | Assumed shrub cover 10-30% | 1,977.4 (3,136.2 ) | 178.7 (311.3 ) |
| Agricultural | Not Defined | 42.6 (43.4) | 0 (0) |
| **Total** | | **19,176.5 (34,756.5)** | **2,080.5 (4,187.4)** |

Notes:
BLM designations apply to BLM lands only.
PPH = Preliminary Priority Habitat (same as NDOW Categories 1 and 2)
PGH = Preliminary General Habitat (same as NDOW Category 3)
NDOW categorizations apply to both private and federal lands.
Category 1 = Essential Irreplaceable Habitat
Category 2 = Important Habitat
Category 3 = Habitat of Moderate Importance

Four greater sage-grouse leks and one historic lek are known to occur in or within 3 miles of the Project Area. The four leks include Antelope Springs, Bishop Flats 1, Bishop Flats 2, and Black Mountain (Barry's) leks. HWA conducted multiple surveys for new leks within 3 miles of the Project Area. During aerial surveys in 2012, a new lek was discovered approximately 2 miles northwest of the Project Area (HWA, 2012). During 2012 surveys (HWA, 2012), males were present on three of the five leks Black Mountain (Barry's), Bishop Flats 2, and the possible new lek.

NDOW biologists have mapped most of the Project Area as greater sage-grouse winter habitat. In 2013, three aerial flights were conducted to locate and document greater sage-grouse winter use areas in the Project Area, as well as within 3 miles of the Project Area (HWA, 2013a). Winter surveys identified two locations of wintering greater sage-grouse, both located over 1 mile northwest of the Project boundary near the possible new lek (approximately 0.75 mile). Wintering greater sage-grouse were observed during two of the three aerial surveys (HWA, 2013a). During greater sage-grouse lek count surveys conducted in 2013, three leks were utilized (Black Mountain [Barry's], Bishop Flats 2, and the possible new lek – HWA, 2013b).




**Legend**

- Project Area
- Pads on Private Lands
- Pads on Federal Lands
- Existing - No Improvement
- Existing - Needs Improvement
- New - Proposed

BLM-USFS Greater Sage Grouse Habitat

- Preliminary Priority Habitat (PPH)
- Preliminary General Habitat (PGH)

NDOW - Sage Grouse Habitat Categorization

- Essential/Irreplaceable Habitat (Category 1)
- Important Habitat (Category 2)
- Habitat of Moderate Importance (Category 3)
- Non-habitat



## MAP 3.3-2

**Greater Sage-Grouse Habitats**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014

BLM IM No. 2012-058 (BLM, 2012b) sets conservation policies to minimize habitat loss in PPH and PGH. In PPH, the BLM's policy is to maintain, enhance, or restore conditions for greater sage-grouse and its habitat." In PGH, BLM's policy is "to reduce and mitigate adverse effects on greater sage-grouse and its habitat to the extent practical" (BLM, 2012c). The Project Area is within the Elko County Planning Area and O'Neil Basin Population Management Unit (PMU). Nine other PMUs occur in Elko County, which supports the highest density of leks in Nevada and supports some of the largest sage-grouse populations in the state. Recently (between 1999 and 2007), wildfires have reduced sage-grouse habitat in Elko County (NDOW, 2011a). Wildfires have substantially diminished sage-grouse wintering habitats over the last ten years (NGSCT, 2010).

**Goose Creek Milkvetch.** The USFWS (2012a) identified one ESA Candidate plant species that occurs in Elko County, the Goose Creek milkvetch. It is typically associated with dry tuffaceous soils from the Salt Lake Formation that have a silty to sandy texture and is not known to occur in the Project Area. The species is restricted to the Goose Creek drainage in Cassia County, Idaho, Box Elder County, Utah, and extreme northeastern Elko County, Nevada (USFWS, 2011). At its closest point, Goose Creek is 60 miles northeast of the Project Area. Goose Creek milkvetch is not expected to occur within the Project Area and is not discussed further.

#### 3.3.4.1.3 BLM-Sensitive and State-Sensitive Species

The list of BLM-Sensitive Species for Nevada is updated every 5 years and was last updated in 2011. Species are listed as sensitive within individual BLM district offices and for the entire state.

**BLM-Sensitive and State-Sensitive Animal Species**

These species are included in Table 3.3-8 and have been identified by sensitive designation statewide (BLM NV-S) and/or sensitive within the Elko District Office (BLM Elko-S). BLM sensitive species that are also protected by Nevada State Law (NRS 501) are included in Table 3.3-8. Some of the species in Table 3.3-8 were discussed elsewhere because they are also listed as BCC.

Western burrowing owls are present in the Project Area. The western burrowing owl is one of the smallest species of owls. They typically inhabit open, dry grasslands and semidesert shrublands, usually near prairie dog colonies (Andrews and Righter, 1992) and occupy the abandoned underground burrows of other animals, such as ground squirrels, rabbits, or prairie dogs. They can dig their own burrows, but usually prefer the deserted excavations of other animals. The owls commonly perch on fence posts or on top of mounds outside their burrows (Andrews and Righter, 1992). In Nevada, the earliest breeding date is April 24 and active nests have been documented as late as August 2 (Great Basin Bird Observatory, no date). A total of five burrowing owls were sighted during the survey period which was at the end of the breeding season. Three of these sightings were observed with individual birds exiting a burrow. These locations were recorded as potential nests. The two remaining sightings were visuals of individual birds, but there was not enough evidence (i.e. fresh mute, regurgitated pellets, or prey remains) to suggest a potential nest site (HWA, 2012).

**Table 3.3-8**
**BLM-Sensitive and State-Sensitive Animal Species with Potential for Occurrence within the Project Area**

| Species' Common Name<br>Scientific Name | Habitat [1] | Location [1] | Federal Status [2] | State Status[3] | NDOW Conservation Priority[4] | Potential [5] Project Area Occurrence |
|---|---|---|---|---|---|---|
| **Mammals** | | | | | | |
| Preble's shrew<br>*Sorex preblei* | In semiarid shrub-grass associations, marshy areas, creeks and bogs bordered by willows and other shrubs; also montane-sagebrush and wet areas in open conifer stands. | Present in Elko County; present in Marys River Watershed | BLM Elko-S | | Not Vulnerable (stable) | Possible |
| Pallid bat<br>*Antrozous pallidus* | In low desert with blackbrush/creosote, shrub-brush sagebrush and salt desert shrub, coniferous forest (pinyon-juniper), and non-coniferous woodlands. | Present in Project Area | BLM NV-S | Protected | | Present |
| Townsend's big-eared bat<br>*Corynorhinus townsendii* | Roosts in caves, mines, trees, buildings, from deserts to high-elevation mixed coniferous forest. Mostly in sagebrush, salt desert shrub, pinyon-juniper, agriculture in Nevada. | Present in Elko County; no records in Project Area vicinity | BLM NV-S | Sensitive | Not Vulnerable (stable) | Possible |
| Big brown bat<br>*Eptesicus fuscus* | In pinyon-juniper, blackbrush, creosote, sagebrush agriculture and urban habitats. Adapted to human habitation. | Present in Project Area | BLM NV-S | | | Present |
| Spotted bat<br>*Euderma maculatum* | From desert scrub to high elevation conifer forests found in pinyon-juniper, sagebrush, riparian; mostly associated with rocky cliffs. Roosts in crevices in cliff faces. | Present in Elko County, no records in Project Area vicinity | BLM Elko-S | Threatened | | Possible |
| Western red bat<br>*Lasiurus blossevillii* | Primarily in wooded habitats and cottonwood/willow riparian areas. Roosts in trees within foliage and leaf litter on the ground. | Present in Project Area | | Sensitive | | Present |
| Hoary bat<br>*Lasiurus cenereus* | Primarily in forested upland habitats, gallery-forest riparian (cottonwoods) and agricultural habitats. Day roosts in trees. | Present in Project Area | BLM NV-S | | | Present |
| California myotis<br>*Myotis californicus* | From Lower Sonoran desert scrub to forests. Roosts in crevices, under bark, hollow trees, mines and caves. | Present in Project Area | BLM Elko-S<br>BLM NV-S | | | Present |
| Small-footed myotis<br>*Myotis ciliolabrum* | From desert scrub, grasslands, sagebrush steppe, to pinyon-juniper woodlands, agriculture, pine-fir forests. Roosts in caves, mines, trees. | Present in Project Area | BLM NV-S | | Not Vulnerable (stable) | Present |
| Long-eared myotis<br>*Myotis evotis* | Mostly in forested areas with ponderosa pine, in pinyon-juniper in northern Nevada, also in sagebrush and desert scrub. Roosts in hollow trees, under tree bark, some in rock crevices. | Present in Project Area | BLM NV-S | | Not Vulnerable (stable) | Present |
| Little brown myotis<br>*Myotis lucifugus* | Use human-made structures for resting and maternity sites but will also uses caves, hollow trees, and rock outcrops. | Present in Project Area | BLM Elko-S | | | Present |
| Fringed myotis<br>*Myotis thysanodes* | Roosts in mines, caves, trees, buildings from low desert scrub to high elevation conifer forests. | Present in Elko County, no records in Project Area vicinity | BLM NV-S | Protected | Not Vulnerable (increase) | Possible |
| Long-legged myotis<br>*Myotis volans* | In pinyon-juniper woodland, montane coniferous forest; roosts in hollow trees. | Present in Project Area | BLM NV-S | | | Possible |

| Species' Common Name<br>Scientific Name | Habitat [1] | Location [1] | Federal Status [2] | State Status [3] | NDOW Conservation Priority [4] | Potential [5] Project Area Occurrence |
|---|---|---|---|---|---|---|
| Yuma myotis<br>*Myotis yumanensis* | Various habitats for low to mid-elevations, sagebrush, salt desert, agriculture, riparian vegetation. Roosts in buildings, trees, mines, caves, bridges, rock crevices. | Present in Elko County, no records in Project Area vicinity | BLM Elko-S | | | Present |
| Western pipistrelle<br>*Pipistrellus Hesperus* | Lower and Upper Sonoran desert habitats with blackbrush, creosote, salt desert shrub, and sagebrush; occasionally in ponderosa pine and pinyon-juniper. | Present in Elko County, no records in Project Area vicinity | BLM NV-S | | | Possible |
| Brazilian free-tailed bat<br>*Tadarida brasiliensis* | Mostly in lower elevation habitats in Sierra Nevada. Roosts on cliff faces, mines, caves, buildings, bridges, and hollow trees | Present in Project Area | BLM NV-S | Protected | Not Vulnerable (stable) | Present |
| Pygmy rabbit<br>*Brachylagus idahoensis* | Associated with dense stands of old-growth sagebrush, on plains and alluvial soils at elevations from 4,500 to 7,000 feet. Use sagebrush for food and shelter. | Present in Project Area | BLM Elko-S | Game | Extremely Vulnerable | Present |
| Fletcher dark kangaroo mouse<br>*Microdipodops megacephalus nasutus* | Upper Sonoran sagebrush desert associated with sagebrush, shadscale, and rabbitbrush in fine gravelly soils from 3,900 to 8,000 feet. | Potentially in Marys River Watershed; documented on-site * | BLM NV-S | Protected | Highly Vulneralbe | Possible * |
| **Birds** | | | | | | |
| Greater sage-grouse<br>*Centrocercus urophasianus* | Large contiguous area of sagebrush with tall grass understory for nesting cover. Avoids steep slopes and sagebrush invaded by pinyon-juniper. | Present in Project Area | ESA-C<br>BLM Elko-S | Game | Highly Vulnerable | Present |
| Bald eagle<br>*Haliaeetus leucocephalus* | Nests and roosts in large cottonwood trees and ponderosa pine along rivers, reservoirs, lakes. Often near prey sources (prairie dog colonies). | Occurs in Northeast Nevada; in Marys River Watershed | BGEP<br>BLM NV-S | Endangered | Not Vulnerable (stable) | Unlikely |
| Swainson's hawk<br>*Buteo swainsoni* | Summer resident in northern and central Nevada. Nests in shrubs, cottonwoods within arid grasslands, deserts, and agricultural area with scattered trees and shrubs. | Occurs in Northeast Nevada; in Marys River Watershed | BLM Elko-S<br>BLM NV-S | | | Possible * |
| Ferruginous hawk<br>*Buteo regalis* | Nest in tops of isolated trees, tops of rock pillars, rock outcrops, hilltops, on man-made structures (utility poles, windmills) in open desert and sagebrush steppe. | Occurs in Northeast Nevada; in Marys River Watershed | BLM NV-S | | Not Vulnerable (stable) | Likely |
| Burrowing owl<br>*Athene cunicularia hypogea* | Nests in burrows, primarily associated with prairie dog towns, in open desert grasslands, heavily grazed pastures. May use burrows of other mammals (ground squirrels, badgers). | Present in Project Area | BLM NV-S | | Not Vulnerable (stable) | Present |
| Sage thrasher<br>*Oreoscoptes montanus* | Breeds and forages in tall sagebrush/bunchgrass, juniper/sagebrush/bunchgrass, mountain mahogany/shrub, and aspen/sagebrush/bunchgrass communities | Present in Project Area | BLM Elko-S | | | Present |
| Brewer's sparrow<br>*Spizella breweri* | Strongly associated with sagebrush, and high sagebrush vigor over most of its range, in areas with scattered shrubs and short grass. | Present in Project Area | BLM NV-S | Sensitive | | Present |

| Species' Common Name<br>Scientific Name | Habitat [1] | Location [1] | Federal Status [2] | State Status [3] | NDOW Conservation Priority [4] | Potential [5] Project Area Occurrence |
|---|---|---|---|---|---|---|
| **Amphibians** | | | | | | |
| Columbia spotted frog<br>*Rana luteiventris* | Slow moving or ponded clear surface water with little or no canopy cover. Deep silt or muck substrate may be needed for hibernation and torpor. | Occurs in Northeast Nevada; in Marys River Watershed | ESA-C<br>BLM Elko-S | Protected | Highly Vulnerable | Possible |
| **Fish** | | | | | | |
| Lahontan cutthroat trout<br>*Oncorhynchus clarki henshawi* | Variety of cold waters ranging from large alkaline lakes to small mountain lakes and from major rivers to small tributaries. In streams they inhabit riffles, deep pools, under shelter objects. | Occurs in Northeast Nevada; in Marys River Watershed | ESA-LT<br>BLM Elko-S | Game | Moderately Vulnerable | Unlikely |
| **Insects** | | | | | | |
| Mattoni's blue<br>*Euphilotes pallescens mattonii* | Higher elevation areas of Elko County associated with its host plant, the slender buckwheat. | Present in Elko County | BLM Elko-S | | | Unknown |
| **Mollusks** | | | | | | |
| California floater<br>*Anodonta californiensis* | Freshwater mussel. In Utah, found in bottoms of small ponds and in a small creek with mud pools and abundant aquatic vegetation multicellular and single cell algae. | Present in Humboldt River Drainage, possible occurrence in Project Area | BLM Elko-S | | | Unlikely |
| Humboldt pyrg<br>*Pyrgulopsis humboldtensis* | Freshwater snail, restricted to the Lahontan Basin. | Present in Elko County | BLM Elko-S | | | Unlikely |
| Vinyards pyrg<br>*Pyrgulopsis vinyardi* | Freshwater snail, restricted to the Lahontan Basin. | Present in Elko County | BLM Elko-S | | | Unlikely |

[1] Habitat and Location sources for taxonomic groups:
Mammals: Zeveloff, 1988; NatureServe, 2012; Bradley, et al., 2006; Aubry, 1997; Copeland and Kucera, 1997; Ports and George, 1990, JBR, 2013a.
Birds: Ryser, 1985; Righter et al., 2004; USGS, 2012.
Amphibians: Columbia Spotted Frog Technical Team, 2003.
Fish: Sigler and Sigler, 1987; Behnke, 1992; USFWS, 2004; USFWS, 1998; NatureServe, 2012.
Insects: NatureServe, 2012.
Mollusks: NatureServe, 2012; Hershler and Sada, 2002.

[2] Federal Status: ESA-C = Candidate species; ESA-LT = Threatened species; BGEP=Bald and Golden Eagle Protection Act; BLM Elko-S = BLM District Elko Office sensitive species; BLM NV-S = BLM Nevada State Office Species.

[3] State Status under N.A.C. Chapter 503 (also NRS 501):
Endangered=species or subspecies in danger of extinction throughout all or significant portion of its range.
Threatened=species or subspecies likely to become endangered throughout all or significant portion of its range.
Protected=species or subspecies is classified as protected by the Commission pursuant to N.A.C. 503.103.
Sensitive=species or subspecies is classified as sensitive by the Commission pursuant to N.A.C. 503.104.

[4] NDOW Conservation Priority from Nevada Wildlife Action Plan (NDOW, 2012b): Extremely Vulnerable, Highly Vulnerable, Moderately Vulnerable, Not Vulnerable (presumed stable or increase likely).

[5] Potential Project Area Occurrence: Present = species observed on-site; Possible = species' habitat associations present on-site, distribution in Project Area vicinity; Unlikely = 1) potential habitat present but unlikely due to distribution.

* Source: Burton, 2012a.

Pygmy rabbits are also present as year-round residents in the Project Area. Although pygmy rabbits are listed under the ESA, it is only a DPS in the state of Washington that received the listing. Pygmy rabbits outside of this DPS are not protected under the ESA. Pygmy rabbits are highly dependent on big sagebrush for food and shelter year-round, particularly sagebrush that is tall and dense where soils are deep and loose to allow burrowing (USFWS, 2010c). Such conditions occur in the Drainage vegetation type. A search for pygmy rabbit burrows and other sign (tracks, feces) was conducted in the Project Area during 2012 (HWA, 2012). The survey revealed 1,488 pygmy rabbit burrows or burrow openings at 529 locations within the Project Area. The rabbit burrows were mostly in Sagebrush Grassland (44 percent of locations) and Sagebrush Community (35 percent) vegetation types, commensurate with the relative extent of those types in the Project Area. Fifteen percent of all burrow locations were observed in Drainage vegetation.

Several species were not detected during the wildlife surveys but are thought to exist within the Project Area based on habitats present, species' habitat associations, and distributions. Preble's shrew, Fletcher dark kangaroo mouse, and Swainson's hawk could also be present. Preble's shrew is found along Mary's River in association with ephemeral and perennial streams in arid and semiarid shrub-grasslands as well as riparian willows and bunchgrasses (NDOW, 2012b). Fletcher dark kangaroo mouse is a subspecies that inhabits stabilized dunes and sandy soils in bottomlands dominated by big sagebrush, rabbitbrush, and horsebrush (NDOW, 2013). They excavate unbranched burrows to a depth of one foot and extending for two to four feet (Zeveloff, 1988). Swainson's hawks are unlikely to overwinter in Nevada. They migrate through Central America to winter in South America and return to nest in Nevada later than other raptor species (Ryser, 1985). They typically nest in cottonwoods or in junipers adjacent to open country (Righter et al., 2004) in which they prey on bats, birds, amphibians, reptiles, and various types of insect (Ryser, 1985).

Seventeen species of bat have been designated as BLM-Sensitive Species of which 14 occur in Elko County (Bradley et al., 2006). Most of the Project Area would be characteristic of Water Source Foraging and Watering Habitat, according to criteria in the Nevada Bat Conservation Plan (Bradley et al., 2006). Some limited Bridge and Building Roosting Habitat and Tree Roosting Habitat may be present within the Project Area in abandoned buildings and cottonwood stands.

JBR (2013a) conducted surveys for bats at eight survey sites within the Project Area during August 2013. The survey used an ultrasonic echolocation monitor to detect vocalizations of bats. This technique provides for species identification and time duration (minutes) of calls. The duration of calls is an index of intensity of use by a species at the site during the survey period. The duration of calls does not equate to numbers of individuals. The eight survey site locations were grouped into two similar sampled habitats: 1) upland sites adjacent to stock ponds and 2) sites adjacent to spring-fed intermittent stream and perennial streams (based on National Hydrologic Dataset). The surveys detected nine bat species within the Project Area (Table 3.3-9). Western small-footed myotis were detected during every survey. Western red bat and California myotis were only detected once.

**Table 3.3-9**
**Average Durations of Echolocation Calls by Nine Bat Species within the Project Area during Surveys Conducted in August 2013**

| Bat Species Recorded [2] | Average Duration (minutes) of Calls by Bat Species per Survey Night in Habitat [1, 2] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Upland Adjacent Stock Pond/Reservoir | | | | | | Intermittent/Perennial Drainage | | | |
| | Site 1 | Site 2 | Site 3 | Site 4 | Site 6 | Mean | Site 5 | Site 7 | Site 8 | Mean |
| Pallid bat *Antrozous pallidus* | | 2 | | | | 0.2 | | | | |
| Big brown bat *Eptesicus fuscus* | 6 | 3 | 3 | | | 1.0 | 3 | | | 0.5 |
| Western red bat *Lasiurus blossevillii* | | | | | | | | 1 | | 0.2 |
| Hoary bat *Lasiurus cinereus* | 1 | | | 1 | 4 | 0.5 | 4 | 1 | | 0.8 |
| California myotis *Myotis californicus* | | 1 | | | | 0.1 | | | | |
| Western small-footed myotis *Myotis ciliolabrum* | 24 | 24 | 14 | 60 | 96 | 18.2 | 20 | 35 | 2 | 9.5 |
| Little brown bat *Myotis lucifugus* | | | 1 | 1 | 1 | 0.3 | | 7 | 3 | 1.7 |
| Long legged myotis *Myotis volans* | 14 | 5 | 4 | 1 | | 2.0 | 8 | 3 | 5 | 2.7 |
| Brazilian free-tailed bat *Tadarida brasiliensis* | 4 | 2 | 9 | 5 | | 1.7 | 1 | | | 0.2 |
| **Totals** | **49** | **37** | **31** | **68** | **101** | **23.9** | **36** | **47** | **10** | **15.5** |

[1] Habitats inferred from digital locations of survey sites provided by JBR (2013a) superimposed on satellite imagery of the Project Area.
[2] Survey Site numbers correspond to those provided by JBR (2013a).

## BLM-Sensitive Plant Species

The 2011 list of BLM-Sensitive Species for Nevada identified 18 sensitive plant species occurring within the Elko BLM District. BLM-designated sensitive plant species for Nevada are included on lists of rare plants compiled by the Nevada Natural Heritage Program (NNHP, 2004). The BLM policy is to provide sensitive species with the same level of protection as provided for candidate species (BLM Manual 6840.06 C) to "ensure that actions authorized, funded, or carried out do not contribute to the need for the species to become listed." The 2011 list of BLM-sensitive species identified 18 plant Species of Special Concern that may occur in the BLM Elko District area. One species is the Goose Creek milkvetch, discussed above. These species and species protected by Nevada State Law (listed in Nevada Administrative Code [NAC] 537.010 and protected under NRS 527.260.300).

Sensitive plant species' associated habitats, elevational ranges, and distributions were evaluated from information in the Nevada Rare Plant Atlas (NNHP, 2001). One species, Elko rockcress, might occur in the Project Area. Its main distribution is in northeastern Elko County in the vicinity of US 93, north and east of the Project Area at elevations ranging from 5,300 to 6,100 feet. It is associated with Wyoming big sagebrush and green rabbitbrush, both of which occur in the Project Area; however, its presence is dependent on moss cover found on volcanic ash and tuff (Morefield, 1997) which is present in the Project Area (see Table 3.3-10).

Occurrences of two other sensitive plant species (Meadow pussytoes and Grimes vetchling) were judged to be unlikely due to known distributions (distance from the Project Area) and/or documented elevational ranges, even though potential habitats could be present (see Table 3.3-10).

Field surveys were conducted for Elko whitlowcress which had been thought to occur within the Project Area. Surveys were conducted and no habitat or individuals were found to exist (HWA, 2012).

**Table 3.3-10**
**BLM-Sensitive Plant Species with Potential for Occurrence within the Project Area**

| Species' Common Name<br>Scientific Name | Habitat [1] | Location [1] | Federal Status [2] | Potential [3] Project Area Occurrence |
|---|---|---|---|---|
| Meadow pussytoes<br>*Antennaria arcuata* | Bare, periodically disturbed soil in marginal, seasonally dry parts of moist, alkaline meadows, seeps, and springs, surrounded by sagebrush and grasslands; from 6,200 to 6,500 feet. | 4 records in Elko County; none in Marys River Watershed | BLM Elko-S | Unlikely |
| Elko rockcress<br>*Boechera falcifructa* | On moderate to steep north-facing slopes in the sagebrush zone, dominated by moss, Wyoming big sagebrush, green rabbitbrush, Sandberg bluegrass; from 5,300 to 6,100 feet. | 6 records in Elko County; none in Marys River Watershed | BLM Elko-S | Possible |
| Grimes vetchling<br>*Lathyrus grimesii* | Dry, shallow, silty clay soils; relatively barren patches on mostly steep slopes of all aspects, sparse to moderately dense cover with bitterbrush, rabbitbrush, cheatgrass; from 6,080 to 8,260 feet. | >15 records in Elko County; none in Marys River Watershed | BLM Elko-S | Unlikely |

[1] Habitats and locations based on descriptions from the Nevada Rare Plant Atlas (NNHP, 2001).
[2] BLM Elko-S = BLM Elko District Office sensitive species.
[3] Potential Project Area occurrence: Possible = within elevational range and species' habitat associations; Unlikely = 1) not expected from elevation/habitat, but in the watershed or 2) habitat and elevation appropriate but unlikely due to distribution.

### 3.3.4.2 Environmental Consequences

#### 3.3.4.2.1 Proposed Action Alternative

**ESA-Listed Species**

**Lahontan Cutthroat Trout.** The USFWS (2014) raised concern that effects to water quality in the Humboldt River by the Proposed Action could affect potential connectivity of currently isolated populations of Lahontan cutthroat trout. Extant subpopulations are present in the Marys River subbasin, Maggie Creek subbasin, East Humboldt River area, and South Fork Humboldt River subbasin. Currently, subpopulations within the same subbasin are isolated from each other due to displacement by non-native salmonids (brook trout, rainbow trout, rainbow-cutthroat hybrids), presence of temporary or permanent barriers to instream movements, seasonally low instream flows, and/or poor habitat conditions (Elliott, 2004; USFWS, 2009). Habitat connectivity to establish functional metapopulations within individual subbasins is a principal focus for the species' recovery.

As discussed in Section 3.2.4.5.1, exploration activity by the Proposed Action would be at depths ≥4,000 feet, much deeper than the shallow aquifers connected to the Humboldt River. Targeted formations are under an overburden containing shales, volcanic tuffs and limestones, which isolate the aquifers from the target zone(s). Based on the separation, the potential for impact to the aquifers, water quality in the Humboldt River, and potential to affect use of the Humboldt River as a connecting corridor by Lahontan cutthroat trout appears to be insignificant and discountable.

The USFWS (2014) also raised concern that effects to water quality in the Marys River by the Proposed Action could affect success of the safe harbor agreement with the Marys River Ranch to re-establish connectivity of currently isolated populations of Lahontan cutthroat trout. The potential exists for LCT to move throughout Marys River and its tributaries during spring flows when there is connectivity and water temperatures among other environmental conditions are suitable for fish movement. A dramatic decrease in spring flows could result in physical barriers such as dry stream reaches or degradation of water quality to the point that even spring flows would not allow LCT to move between tributaries. Neither of these scenarios is likely; nor would the Project have any effects to influence their likelihood. Therefore, there would be no change to the potential for expansion of LCT within the watershed as a result of this Project.

**ESA Candidate Species**

ESA candidate species that could be affected by the Project are discussed below.

**Columbia Spotted Frog.** Columbia spotted frogs that might occur in Tabor Creek, Burnt Creek, Bishop Creek, and the Humboldt River would not be affected because surface disturbance would not occur within 400 feet of all streams, creeks, springs, and wetland areas.

**Greater Sage-Grouse.** The Greater Sage-Grouse National Policy Team created a National Technical Team (NTT) which in turn created a report on sage-grouse conservation measures that included science based recommendations for managing uses on BLM-administered lands. The NTT report identified three primary potential risks to sage-grouse from energy and mineral development as follows:

- Direct disturbance, displacement, or mortality of grouse:
- Direct loss of habitat, or loss of effective habitat through fragmentation and reduced habitat patch size and quality; and
- Cumulative landscape-level impact.

Oil exploration including pad construction, well drilling, well completion, oil production, and related activities would create noise and visual intrusion, and fragment habitat. New roads increase human access, increase human activity, fragment habitat, and increase the spread of invasive weeds. Oil exploration could potentially disturb sage-grouse during critical times such as lekking, nesting, brood rearing, and winter seasons. Specifically, energy development may impact sage-grouse in the following or more ways:

- Lek and nest abandonment may increase if leks and nests are repeatedly disturbed by raptors perching on nearby structures;
- By vehicle traffic on nearby roads;
- By noise and human activity during the breeding season;
- Permanent loss of habitat due to vegetation removal; and
- Degradation of affected vegetation by invasive and noxious weeds.

The BLM has prepared a Greater Sage-Grouse Management Plan for the Marys River Oil and Gas Exploration Project (Appendix K) and Noble has proposed BMPs for protection of sage-grouse and sage-grouse habitat (Exhibit F in the MSUPO). BLM's Greater Sage-Grouse Management Plan includes BMPs that are found in the NTT report, many of which are also included in Noble's BMPs. The BMPS in the BLM Greater Sage-Grouse Management Plan include the following:

- Establish 20 mph speed limits on BLM system roads to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds;
- Close and rehabilitate duplicate roads;
- Site and/or minimize linear ROWs to reduce disturbance to sagebrush habitats;
- Restrict the construction of tall facilities and fences to the minimum number and amount needed;
- During active lek season (March 1 to May 15) limit noise to less than 10 dBA above pre-Project ambient noise level at the perimeter of a lek at sunrise and during morning hours (4:00 a.m. to 10:00 a.m.);
- Reduce produce noise by using housings that absorb noise on engines and motors. Orient noise producing equipment to direct noise away from sensitive areas;
- Require noise shields when drilling during the lekking, and nesting seasons (March 1 to June 15) on pads that models indicate risk of exceeding the 10 dBA above ambient threshold;
- Use closed-loop drilling systems and store produced water in closed tanks to eliminate water pits and impoundments and eliminate threats from West Nile Virus;
- Subcontractors will comply with the same protection measures used in company operations to avoid or reduce disturbances to occupied sage-grouse habitats;
- Restoration plant species selection will be based around pre-disturbance conditions and ecological site potential as indicated by pre-disturbance vegetation cover and ecological site surveys for each well pad and road location;
- Maximize the area of interim reclamation on long-term access roads and well pads through techniques such as; reshaping, topsoiling, and re-vegetating cut and fill slopes. Reclaim unused portions of pads when transitioning into the production phase; and

- Final reclamation will resemble the pre-disturbance landforms.

Effects from Raptors and Corvids. Corvids are effective nest predators of greater sage-grouse, taking eggs and possibly recently hatched chicks, and their abundance has been related to higher nest predation rates of sage-grouse (Hagen, 2009). Common ravens have been documented roosting and nesting on a variety of industrial infrastructures, including tanks and other elevated structures where available (Merrell, 2012). Ravens already nest in the vicinity of the Project Area and, if undeterred, would be expected to perch, roost, and/or nest on the 13-foot tall oil and water storage tanks proposed for each pad. Raptors in the area would also be expected to utilize the elevated structures as hunting perches. Sage-grouse tend to use nesting habitats and utilize brood-rearing habitats where there are lower densities of ravens and other avian predators such as raptors (Dinkins et al., 2012). Predation of nests, sage-grouse chicks, and adults would adversely affect already low recruitment in the O'Neil Basin PMU. Restriction of the construction of tall facilities and fences to the minimum number and amount need would minimize potential effects from perching raptors and corvids.

Vehicle Traffic on Nearby Roads. All roads proposed for access to well pads are outside of the 3 mile buffer zone of known or newly discovered leks with the exception of the proposed local and resource roads to well pads R-10N, R-14E, R-21A, and R-21K which are within the 3 mile buffer zone of the Bishop Flats 2 lek (males present in 2013). Restricting traffic on these roads during the lekking season (March 1 to May 15) to portions of the day between 10:00 a.m. and 5:00 p.m. would minimize impacts from traffic. Adhering to a 20 mph speed limit on BLM system roads would also reduce impacts to sage-grouse in the Project Area.

Noise and Human Presence During Breeding Season. Noise above background levels could be exceeded in breeding habitats, brood-rearing habitats, and/or wintering habitats at varying distances from exploratory well pads. Simulated noise from natural gas well pads and traffic on roads has been shown to negatively affect male attendance at leks (Blickley et al., 2012). Female sage-grouse moved farther from leks to nest and avoided nest initiation in areas disturbed by vehicles (1 to 12 vehicles per day), probably due to combinations of the traffic activity and associated noise (Lyon and Anderson, 2003). No studies of noise effects on sage-grouse during winter have been found but wintering sage-grouse avoided coal bed natural gas developments, potentially within distances of 1,000 meters or 0.62 miles (Naugle et al., 2006). Given overall avoidance of wildlife from anthropogenic noise (Federal Highway Administration, 2004), sage-grouse would be expected to avoid sites with Project-related noise during all life phases, throughout the annual cycle.

Baseline noise measurements were taken at three greater sage-grouse leks proximate to the Project Area (HWA, 2013a) using procedures recommended by Blickley et al. (2012) for monitoring noise at sage-grouse leks. Noise measured during mornings (between 12 am to 9am) at the leks in late April and early May 2013 yielded residual noise levels ranging from 18 dBA to 25.5 dBA when winds were calm but as high as 53 dBA during windy conditions (HWA, 2013a).

Noise levels produced during the Construction/Drilling Phase by a drilling rig that would be used in the Marys River Project Area were measured by Brennan (2013a). The measured noise was used to model noise from the same drilling rig on each of the proposed well pad locations to a distance where the noise would attenuate to 25 dBA (Brennan, 2013b). The modeled 25 dBA noise level contours are more than 3.5 miles from the nearest greater sage-grouse lek for all of the proposed well pads. With snow and ice, noise levels may be 2 to 4 dBA higher than with typical grounds cover but the noise levels would still attenuate to 25 dBA within 3 miles of the nearest lek (Brennan, 2013b). Based on modeling, no drilling rig noise would be audible at leks. Depending on when drilling a specific well is initiated, noise above background levels could be exceeded in breeding habitats, brood-rearing habitats, and/or wintering habitats from exploratory well pads. In Nevada, leks are attended from March through May, brood-rearing habitats are utilized from April through August, and winter habitats are used from October through March (BLM, 2000).

Noise would be limited to less than 10 dBA above pre-Project ambient noise levels at sunrise and during morning hours of 4:00 a.m. to 10:00 a.m. during the active lek season (March 1 to May 15). When drilling on pads during the lekking and nesting seasons (March 1 to June 30) where noise models indicate a risk of exceeding 10 dBA above ambient levels, noise shields would be used to minimize impacts to greater sage-grouse. Completion actions would follow timing restrictions related to noise at leks. Noise would also be reduced by using housings that absorb noise on engines and noise producing equipment would be oriented to direct noise away from sensitive areas. Constructing and upgrading of the portion of the new and local roads within the 3-mile buffer zone of the Bishop Flats 2 lek leading to well pads R-10N, R-14E, R-21A, and R-21K outside of the lekking and nesting season would further reduce impacts to greater sage-grouse.

Long-term noise on each producing well pad during the Production/Operations Phase would be from pumping units, generators, line heater, and flares and would be less than noise produced during the Construction/Drilling Phase.

Permanent Loss of Habitat. Implementation of the Proposed Action would affect sage-grouse use of breeding, nesting, brood-rearing and wintering habitats within the Project Area (see Map 3.3-2). The following analysis of effects to important sage grouse habitat separates the NDOW and BLM habitat discussions because the NDOW categories apply to the entire Project Area, while the BLM habitat classifications only apply to BLM-administered land.

Table 3.3-11 presents the estimated potential vegetation disturbance of sage-grouse habitat categories with construction of all 33 well pads and all access roads. Twenty of the identified 33 well pad locations are within BLM PPH designation, and none of the identified well pads are within BLM PGH designation.

Surface disturbance exceeding 3 percent of priority habitats is a density threshold to be avoided or requiring mitigation if exceeded (Sage-grouse National Technical Team, 2011). The BLM Greater Sage-Grouse Management Plan states that there would be a 3 percent disturbance cap within PPH. Disturbance would include existing anthropogenic and proposed Project disturbances. Evaluation of disturbance in priority habitats on an individual lek basis and for the Project Area is presented in Table 3.3-12. Project disturbance in priority habitats added to existing disturbances would not exceed the 3 percent disturbance cap within PPH in any of the evaluated areas.

**Table 3.3-11**
**Vegetation Types Affected within Sage-Grouse**
**Habitat Categories on All Lands under the Proposed Action (33 Well Pads)**

| Mapped Vegetation | Shrub Cover Characteristics | BLM PPH (NDOW Categories 1 and 2) | BLM PGH (NDOW Category 3) |
|---|---|---|---|
| | | (acres) | |
| Sagebrush Community | Shrub cover 10-30% | 146.2<br>(190.1) | 0.0<br>(0.0) |
| Sagebrush-Rabbitbrush | Shrub cover 10-20% | 17.3<br>(24.4) | 0.0<br>(0.0) |
| Sagebrush-Grassland | Shrub cover 5% | 66.3<br>(100.7) | 3.2<br>(18.6) |
| Rabbitbrush-Grassland | Shrub cover 10-20% | 5.6<br>(10.5) | 0.0<br>(0.0) |
| Grassland | Shrub cover <5% | 2.0<br>(14.9) | 0.4<br>(9.8) |
| Riparian | Not Defined | 0.0<br>(0.2) | 0.0<br>(0.0) |
| Drainage | Assumed shrub cover 10-30% | 11.8<br>(12.2) | 0.0<br>(0.4) |
| **Total** | | **249.2<br>(353.0)** | **3.6<br>(28.8)** |

Notes:
BLM designations apply to BLM lands only.
PPH = Preliminary Priority Habitat (same as NDOW Categories 1 and 2)
PGH = Preliminary General Habitat (same as NDOW Category 3)
NDOW categorizations apply to both private and federal lands.
Category 1 = Essential Irreplaceable Habitat
Category 2 = Important Habitat
Category 3 = Habitat of Moderate Importance

**Table 3.3-12**
**Disturbance in Priority Habitats by Lek and for the Project Area**

| Analysis Area | Habitat Area (acres) | Existing Disturbance (acres)[1] | Proposed Project Disturbance (acres)[2] | Total Disturbance (acres) | Percent of Project Area |
|---|---|---|---|---|---|
| **Bishop Flats 2 Lek (3-mile Buffer)** | | | | | |
| PPH-Category 1 and 2 | 6,321.3 | 122.8 | 4.7 | 127.5 | 2.0 |
| PGH-Category 3 | 8.4 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Black Mt (Barrys Lek) Lek (3-mile Buffer)** | | | | | |
| PPH-Category 1 and 2 | 8,794.8 | 101.2 | 0.0 | 101.2 | 1.2 |
| PGH-Category 3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Possible New Lek (3-mile Buffer)** | | | | | |
| PPH-Category 1 and 2 | 8,521.7 | 85.7 | 0.0 | 85.7 | 1.0 |
| PGH-Category 3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Project Area** | | | | | |
| PPH-Category 1 and 2 | 19,176.5 | 263.5 | 249.1 | 512.6 | 2.7 |
| PGH-Category 3 | 2,080.5 | 46.1 | 3.6 | 49.7 | 2.4 |

[1] Existing disturbance includes roads, ranches, gravel pits, and seismic disturbance.
[2] Proposed disturbance includes all ground disturbances; new roads, improved roads, well pads including temporary disturbances.

Degradation of Vegetation by Weeds and Dust. Impacts to sagebrush vegetation could result from fugitive dust created by construction vehicles and pickup trucks, as well as from invasive non-native species and noxious weeds establishing in disturbed areas. Fugitive dust effects on vegetation are discussed in Section 3.3.2, and invasive non-native species and noxious weed effects and protection measures are discussed in Section 3.3.1.

**Special Status Animal Species**

Effects to BLM special status animal species would generally be similar to effects addressed in Section 3.3.3 (Migratory Birds), in Section 3.3.5 (Wildlife and Fisheries), and to other species discussed in this section.

**Bats.** The Proposed Action could impact bats by adversely affecting foraging habitats, contaminating surface water, generating noise that could interfere with echolocation, and installing night lighting that may alter their behavior. Bat species forage in the Project Area and vicinity, although suitable roosting habitats for the species would not be affected. Construction and operation of all Project components would generate noise levels that exceed ambient levels various distances from roads and pads. Noise from traffic and other sources is believed to interfere with bats' echolocation of insect prey (Jones, 2008). Loss or reduction of foraging habitat can adversely affect bats (Adams, 2003).

Because bats occur near water sources and stock ponds in the Project Area (see Table 3.3-8), avoidance of stock ponds as well as all streams, creeks, springs and wetland areas for Project disturbance and fueling of vehicles by 400 feet would minimize impacts to bats.

Drilling is anticipated to occur on a 24-hour basis, thereby requiring the use of lights during night-time hours. Night lighting would likely be installed on pads during construction and possibly during operation. Lighting could act as barriers to bat movements (Kuijper et al., 2008), reduce bat activity in the immediate vicinity (Stone et al., 2009), or have an opposite effect (mercury vapor lamps) by attracting nocturnal insects (Svensson and Rydell, 1998; Rydell and Racey, 1993). Lighting would be controlled to minimize the potential for bat collisions (i.e., angled down). This may attract insects to the drill pads, and subsequently attract foraging bat species (JBR, 2013b). Bats attracted to the drill pads may attempt to use exhaust stacks on production facilities to perch, roost, or nest and become trapped, poisoned by carbon monoxide, or incinerated (BLM, 2013).

Flaring natural gas on well pads during operation would occur, day and night. During operations, flares produce noise, light, and heat that can affect birds and bats. Noise levels depend on gas pressure and nozzle design, luminosity and light wavelength (flame color) depends on the temperature of gas combustion, and thermal emissions depend on flame geometry, luminosity and on ambient conditions of humidity, wind, and solar intensity (Klett and Galeski, 1976). Radiant heat flux decreases with squared distance from the point of emission.

Bird deaths have been attributed to natural gas flares. Circumstances would not be duplicated by the Proposed Action. One instance involved a 104 meter tall flare stack, with rain and fog during bird migration, and $SO_2$ and $H_2S$ emitted from the stack; approximately 3,000 passerines died (Bjorge, 1987). In another instance, migrating birds were apparently attracted to a 30 meter flare stack at a LNG regasification plant during migration under fog and overcast conditions; an estimated 6,800 birds were killed (CBC News, 2013).

There are no published or anecdotal reports of bat mortality at flares although there are anecdotal accounts of moths attracted to gas flares (for example, Global Taxonomy Initiative, no date). If moths are attracted to flares at night, bat presence would be likely and they could potentially be injured or killed from the radiant heat.

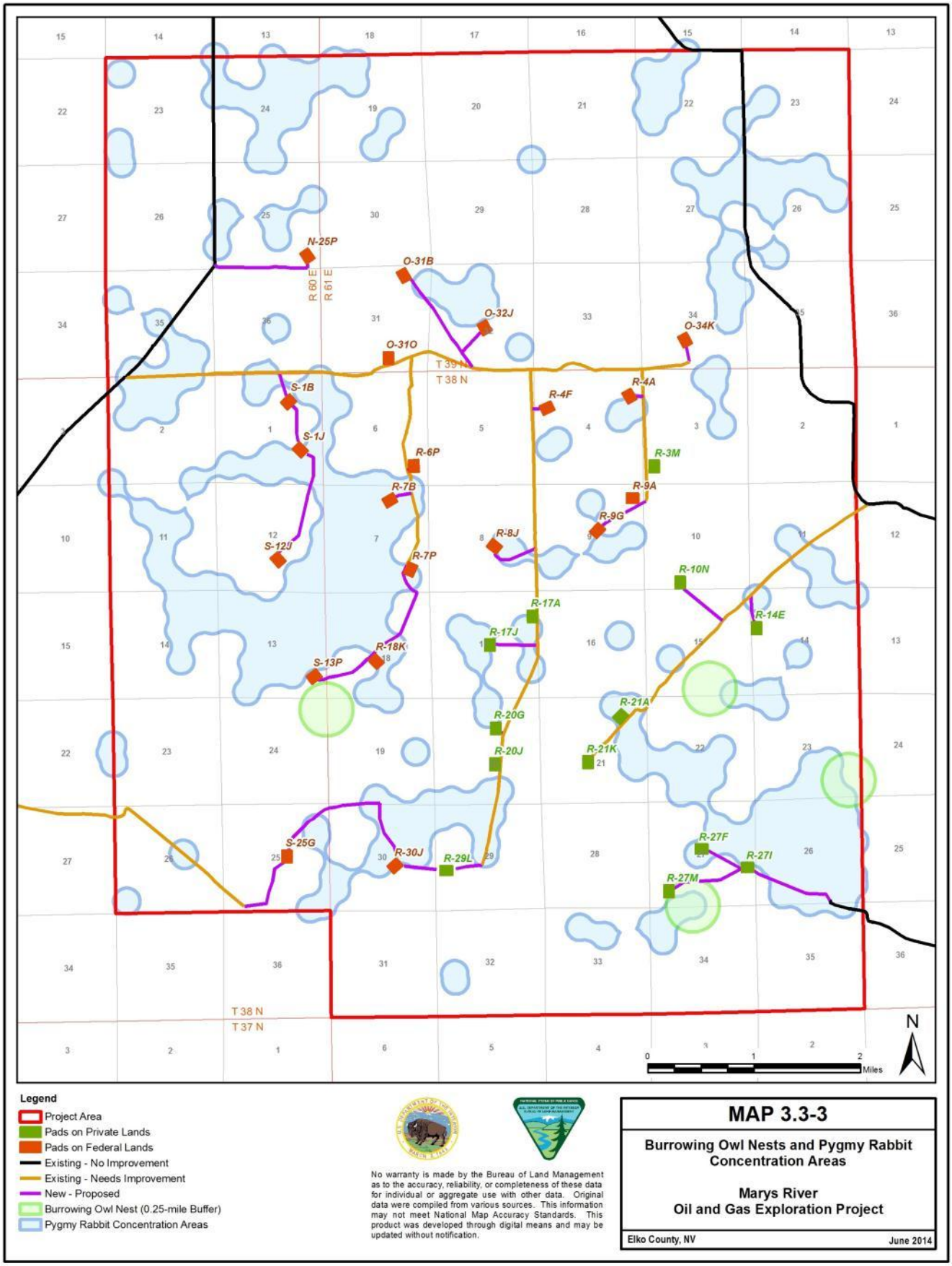
The BBCS is designed to reduce the potential risks of bird and bat mortality that may result from implementing the Proposed Action. The measures included in the BBCS and the above discussion of effects are listed in Section 2.2.1.6, Project Design Features. With implementation of the measures in the BBCS, effects to bats would be minimized.

**Birds.** As discussed in Section 3.3.3 (Migratory Birds), the BLM-sensitive birds that possibly nest in the Project Area are likely to complete nesting by early August (Great Basin Bird Observatory, no date). Raptor nesting surveys would be conducted by Noble's contractor every year that new Project components are implemented. Raptor spatial and temporal buffers would be implemented around all identified active nest sites prior to construction activities.

**Western Burrowing Owls.** Burrowing owls are protected by Nevada State Law and the MBTA. The BLM Elko District defined seasonal buffers for burrowing owls from March 1 to August 31, extending 0.25 mile from the nest burrow. Four burrowing owl nest buffers within the Project Area are shown on Map 3.3-3. The well pad locations have been placed away from occupied nest burrows and their buffer zones. Surveys for new burrowing owl nest sites would be conducted prior to construction of roads and well pads if initiated during the nesting period. If new occupied burrowing owl nests are found, surface disturbing activities would be delayed until after August 31 within 0.25 mile of nests. By following these measures, direct and indirect effects to burrowing owls would be reduced to a negligible level.

**Pygmy Rabbits.** Effects to pygmy rabbits are expected to be similar to effects to greater sage-grouse and other wildlife. Pygmy rabbits are a sagebrush-obligate species and may be sensitive to direct loss or modification of sagebrush habitat by any number of causes, including energy exploration and development (USFWS, 2010c). Well pad locations have been placed away from occupied pygmy rabbit burrows (see Map 3.3-3) to the extent possible. One exception is the extension of the Tetuan Road leading to well pads R-27M, R-27F, and R-27I which would require upgrading. However, surveys for burrows were conducted during 2012 and new burrows are expected to have been excavated and inhabited during the time intervening until Project initiation. Ground vibrations and direct impact to burrows by heavy construction equipment are expected to cause collapse, similar to vibroseis truck impacts (Wilson, 2011).

Pygmy rabbit surveys would be conducted prior to construction on the four well pads proposed for the first year and on several access roads that are close to active pygmy rabbit burrows. If construction disturbances cannot avoid burrows by 100 feet and in more densely populated pygmy rabbit areas (e.g., Sections 7 and 26, T38N, R61E), the BLM may also require a biological monitor to precede ground clearing machinery to ensure that an adequate buffer is maintained. In addition, individual pygmy rabbits inhabiting burrows that could not be avoided could be live-trapped (see trapping techniques in Burak, 2006) and relocated to suitable habitat away from the impacted occupied burrow. Brush hogging or mowing areas within 100 feet of pygmy rabbit burrows within 72 hours of ground disturbance would encourage pygmy rabbits to leave the area.




**Legend**

- Project Area
- Pads on Private Lands
- Pads on Federal Lands
- Existing - No Improvement
- Existing - Needs Improvement
- New - Proposed
- Burrowing Owl Nest (0.25-mile Buffer)
- Pygmy Rabbit Concentration Areas

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

## MAP 3.3-3

**Burrowing Owl Nests and Pygmy Rabbit Concentration Areas**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014

**Special Status Plant Species**

Effects to Elko rockcress could occur if appropriate habitat (moss cover found on volcanic ash and tuff) is present in the areas planned for disturbance. Potential effects to Elko rockcress would be minimized or avoided by surveying the planned areas for habitat (and the plant if the habitat is present) prior to ground disturbance.

**Mitigation Measures**

The following mitigation measures have been identified to further reduce potential impacts to Special Status Animal Species:

- Noble should enter into an MOU with the BLM and NDOW for implementation of the Greater Sage-Grouse Management Plan.
- Noble should agree to a maximum of $600 per disturbed acre at 3:1 ratio for PPH/Category 1 and 2 and 2:1 ratio for PGH/Category 3 for mitigation off-sets to be put in an Impact Compensation Fund (escrow or similar account) for later use on off-site sage-grouse habitat mitigation projects.
- No activities should occur on the following well pads or associated access roads during the breeding and nesting season (March 1 to June 30): O-31B, O-26J, O-34K, R-10N, R-14E, R-3M, R-27E, R-27I.
- During the sage-grouse breeding and nesting seasons (March 1 to May 15), traffic should be restricted to portions of the day between 10:00 a.m. and 5:00 p.m.
- Construction of the new resource and local roads and upgrading of existing roads within the 3-mile buffer zone of the Bishop Flats 2 lek leading to well pads R-10N, R-14E, R-21A, and R-21K should occur outside of the lekking and nesting season.
- The extension of the Tetuan Road leading to well pads R-27M, R-27F, and R-27I should be rerouted so that it does not coincide with occupied pygmy rabbit burrows. Appropriate surveys (biological and cultural) should be conducted.
- Where proposed disturbance is within 100 feet of a pygmy rabbit burrow, the area should be brush-hogged or mowed within 72 hours of ground disturbance to encourage pygmy rabbits to leave the area.
- In more densely populated pygmy rabbit areas, a BLM-approved biological monitor should be required to precede construction to ensure that an adequate buffer is maintained.
- Prior to ground disturbance, Noble should determine if suitable substrate for Elko rockcress (moss cover found on volcanic ash and tuff) is present and if so, conduct surveys for Elko rockcress. If Elko rockcress is found, Noble should consult with the BLM regarding appropriate mitigation measures.

**Monitoring**

- The Greater Sage-Grouse Management Plan requires compliance monitoring of Design Features, BMP's and Mitigation Measures that would begin immediately upon the commencement of ground disturbing activities. Compliance monitoring would be ongoing through the life of the Project through site visits. Also, the Plan requires that sage-grouse lek attendance would continue to be monitored for trends and impacts throughout the life of the Project on leks within 4 miles of annual Project activities including production and hauling activities. If the Project has no activities for that calendar year, monitoring will not be required. Currently, Noble plans to voluntarily monitor leks for 5 years to get attendance trend data; Noble is in year 3 of that collection effort.

#### 3.3.4.2.2 No Action Alternative

Under the No Action Alternative, there would be no change from either the Proposed Action Alternative or the Visual Alternative to current conditions for Special Status Animal Species within the Project Area.

#### 3.3.4.2.3 Visual Alternative

Effects to Special Status Animal Species under the Visual Alternative would be similar to those described above for the Proposed Action Alternative.

Table 3.3-13 presents the estimated potential vegetation disturbance of NDOW sage-grouse habitat categories and BLM sage-grouse categories for the identified 27 well pads and all access roads. Similar to the Proposed Action, 20 of the identified 33 well pad locations are within BLM PPH designation, and none of the identified well pads are within BLM PGH designation.

**Table 3.3-13**
**Vegetation Types Affected**
**within BLM Sage-Grouse Habitat Categories for 27 Well Pads**

| Mapped Vegetation | Shrub Cover Characteristics | BLM PPH (NDOW Categories 1 and 2) | BLM PGH (NDOW Category 3) |
|---|---|---|---|
| | | (acres) | |
| Sagebrush Community | Shrub cover 10-30% | 146.2<br>(190.3) | 0.0<br>(0.0) |
| Sagebrush-Rabbitbrush | Shrub cover 10-20% | 17.3<br>(24.4) | 0.0<br>(0.0) |
| Sagebrush-Grassland | Shrub cover 5% | 57.7<br>(66.7) | 0.0<br>(0.0) |
| Rabbitbrush-Grassland | Shrub cover 10-20% | 5.6<br>(10.5) | 0.0<br>(0.0) |
| Grassland | Shrub cover <5% | 2.0<br>(14.9) | 0.0<br>(0.0) |
| Riparian | Not Defined | 0.0<br>(0.1) | 0.0<br>(0.0) |
| Drainage | Assumed shrub cover 10-30% | 11.8<br>(12.2) | 0.0<br>(0.0) |
| **Total** | | **240.6**<br>**(319.1)** | **0.0**<br>**(0.0)** |

Notes:
BLM designations apply to BLM lands only.
PPH = Preliminary Priority Habitat (same as NDOW Categories 1 and 2)
PGH = Preliminary General Habitat (same as NDOW Category 3)
NDOW categorizations apply to both private and federal lands.
Category 1 = Essential Irreplaceable Habitat
Category 2 = Important Habitat
Category 3 = Habitat of Moderate Importance

### 3.3.4.3 Cumulative Effects

Cumulative effects to sensitive and special status species are discussed in Section 3.3.5.3/Cumulative Effects.

### 3.3.5 WILDLIFE AND FISHERIES

#### 3.3.5.1 Current Conditions

**Big Game**

The entire Project Area is pronghorn summer range. The Project Area overlaps mule deer and elk limited use habitats. The Project Area is within Management Unit 075, managed by NDOW for big game harvest. Species' common and scientific names used in the text and tables are provided in Appendix M.

**Pronghorn.** Pronghorn within Management Unit 075 and adjacent Management Units (072 and 074) in northeastern Elko County have had low fawn recruitment, averaging 39 fawns per 100 does during the period 2003 to 2012. Although only 25 fawns per 100 does were observed in 2011, the productivity rebounded to 64 fawns per 100 does in 2012 (NDOW, 2013). Related to increased recruitment, the 2013 population estimate was 1,200 pronghorns in the northeastern Elko County Unit Group (including Units 075, 072 and 074), an increase from 1,000 animals in 2012 (NDOW, 2013). Habitats within northeastern Elko County have been affected by wildfires during the past 10 years. Growth of perennial grasses and forbs have responded positively on summer ranges after the fires but shrubs, such as big sagebrush and bitterbrush, have not recovered to the detriment of pronghorn, which depend on shrub browse for winter survival (NDOW, 2011b).

**Mule Deer.** The 2013 mule deer population in northeastern Elko County was estimated at 13,000 deer, a decrease from 13,300 mule deer in 2012 (NDOW, 2013). Spring composition surveys in 2013 indicated 31 fawns per 100 adults, a decrease from 35 fawns per 100 adults in 2012 (NDOW, 2013) but similar to fawn recruitment of 36 fawns per 100 adults in 2010 (NDOW, 2012c). Similar to pronghorns, mule deer habitats in northeastern Elko County have been reduced by wildfires that have limited shrub availability. In addition to habitat loss, mule deer are struck by vehicles as they migrate to seasonal ranges across Interstate-80 and US 93 (NDOW, 2011b). Several deer-crossing structures (overpasses, underpasses), recently constructed on US 93, have reduced mule deer-vehicle mortality.

**Elk.** A small population of elk inhabits Unit 075 in the Snake Mountains, east and north of the Project Area. The 2013 population estimate was 300 elk, an increase from 270 animals in 2012 (NDOW, 2013). Recruitment of calves (57 calves per 100 cows) in 2012-2013 substantially increased from 45 calves per 100 cows in 2011-2012 (NDOW, 2012c). The Project Area is not identified as critical elk habitat.

**Upland and Small Game**

Upland game and small game animals are managed within counties (NDOW, 2009). Beavers and coyotes and/or their sign were observed within the Project Area in 2012 (HWA, 2012). Small game mammals including mountain cottontail rabbit, pygmy rabbit, and white-tailed jackrabbit) occur in the Project Area. Upland game birds likely to occur in the Project Area include chukar, mourning doves, greater sage-grouse, and Hungarian partridge. Migratory waterfowl also occur in the Project Area (HWA, 2012), including Canada goose, mallard, and northern pintail.

**Non-Game Species**

Non-game bird species were discussed under Migratory Birds, Section 3.3.3. Only one reptile, the desert horned lizard, was seen during 2012 surveys (HWA, 2012). However, other non-game reptiles occur including the common sagebrush lizard (Edge Environmental, 2012), Great Basin collared lizard, Great Basin whiptail, western fence lizard, western skink, and western rattlesnake (Burton, 2012b). Four species of non-game mammals observed in the Project Area

include chipmunks (*Tamias* sp.), Townsend's ground squirrel, Ord's kangaroo rat, and porcupine. Pocket gopher mounds were also observed (HWA, 2012). Ord's kangaroo rats and Townsend's ground squirrels are common to arid sagebrush and saltbush-greasewood communities, and porcupines inhabit shrubby stream bottomlands (Zeveloff, 1988). In addition, Preble's shrew, and Fletcher dark kangaroo mouse possibly occur in the Project Area in association with sagebrush shrub-grassland habitats and are non-game wildlife species.

## Fish

No information has been found regarding fish occurrence within the Project Area. Native non-game fish that inhabit the upper Marys River drainage were reported by Elliott (2004). Non-native game fish species that occur within the Humboldt River in Elko County have been reported by NDOW (2010). Based on fish species' habitat associations and tolerance to water temperatures (Sigler and Sigler, 1987), three non-game species (redside shiner, Tui chub, and Tahoe sucker) and one game species (black bullhead) may occur in Tabor Creek, Bishop Creek, and/or the Humboldt River that flow as perennial waterbodies through the Project Area (see Table 3.3-14).

**Table 3.3-14**
**Fish Species, Habitats, and Potential Occurrence within the Project Area**

| Common Name<br>Scientific Name | Habitat [1] | Spawning [1] | Project Area Occurrence |
|---|---|---|---|
| **Native Non-Game Fish [2]** | | | |
| Tui chub<br>*Gila bicolor* | In small streams, large lakes/reservoirs with temperatures ≈ 70°F. | Late April to early August with temperatures 62°F to 72°F. | Possible |
| Speckled dace<br>*Rhinichthys osculus* | Swift, cold riffles in mountain streams; quiet, cool water in springs. | June and July with temperatures ≈65°F. | Likely |
| Redside shiner<br>*Richardsonius balteatus* | Ponds, lakes, streams, and irrigation ditches. | April to June with temperatures >50°F. | Possible |
| Tahoe sucker<br>*Catostomus tahoensis* | Large and small lakes and streams with warmer inshore, shallow habitats. | Lakes, streams in spring with temperatures ≈53°F. | Possible |
| Mountain sucker<br>*Catostomus platyrhynchus* | In riffles with gravel, rubble, boulders; clear cold streams (55°F to 70°F). | June and July with temperatures >50°F. | Possible |
| Paiute sculpin<br>*Cottus beldingi* | Rocky riffles in cold clear water, rubble or gravel substrates. | May or June in shallow water, riffles. | Unlikely |
| **Non-Native Non-Game Fish** | | | |
| Common carp<br>*Cyprinus carpio* | Large deep lakes/reservoirs to small warm ponds/streams. | Spring with temperatures from 58 °F to 67 °F. | Possible |
| **Non-Native Game Fish [3]** | | | |
| White catfish<br>*Ictalurus catus* | Adapted to large rivers, reservoirs with slightly brackish water, slow currents. | Water temperatures >70°F. | Unlikely |
| Black bullhead<br>*Ictalurus melas* | In turbid water, silt bottom, no strong current, streams, and ponds. | May to July with temperatures 65°F to 70°F. | Possible |
| Channel catfish<br>*Ictalurus punctatus* | Adapted to large, moderately swift streams with pools, undercut banks. | Spring to early summer with temperatures 72°F to 75°F. | Unlikely |
| Bluegill<br>*Lepomis macrochirus* | Clean waters of creeks, ponds, reservoirs; temperatures 70°F to 80°F. | Spring with temperatures from 64°F to 80°F. | Unlikely |
| Smallmouth bass<br>*Micropterus dolomieui* | Rocky and sandy areas, large lakes, streams, rivers, shallow water. | Late spring to early summer with temperatures 61°F to 65°F. | Unlikely |
| Largemouth bass<br>*Micropterus salmoides* | Upper levels of warm ponds, lakes, and large slow rivers. | Late spring to midsummer with temperatures 62°F. | Unlikely |

[1] Sigler and Sigler, 1987.
[2] Elliott, 2004.
[3] NDOW, 2010.
Note: Lahontan cutthroat trout are discussed in the special status species section.

### 3.3.5.2 Environmental Consequences

#### 3.3.5.2.1 Proposed Action Alternative

**Game and Non-game Species**

**Direct Mortality.** Project-related traffic could result in wildlife mortalities, especially for mammals and reptiles. Species most susceptible to vehicle-related mortality include those that are inconspicuous (lizards, snakes, and small mammals), those with limited mobility, burrowing species (mice and voles), wildlife with behavioral activity patterns (i.e., nocturnal activity) making them vulnerable, and wildlife that may scavenge roadside carrion (Leedy, 1975; Bennett, 1991; Forman and Alexander, 1998). Maintaining speed limits on paved roads and not exceeding 20 mph on unpaved roads should reduce the potential for vehicle collisions with terrestrial wildlife.

Poaching wildlife is a possible consequence of additional human access within wildlife habitats (Comer, 1982). To reduce potential poaching by Project workers, Noble would provide all employees with environmental awareness training that addresses the consequences of poaching and provides information about federal and state wildlife laws.

**Habitat Loss and Alteration.** Effects related to construction activities such as vegetation clearing, noise, and human presence contribute to habitat loss and alteration. Construction would remove and alter habitats used by wildlife. Disturbed ground surfaces can be invaded by noxious weeds. Invasive and noxious weeds can interfere with reestablishment of native vegetation species and many weeds are unpalatable to wildlife (Whitson, et al., 1996). Early and successful restoration of vegetated seasonal ranges would discourage weeds and provide more suitable habitat, especially on previously disturbed lands. Clearing native vegetation and exposing bare ground surfaces, especially within closed canopy big sagebrush shrub communities, allows invasive species, particularly annuals, to become established.

Approximately 34 percent of the surface disturbance for new road construction and road improvement is planned for reclamation within one growing season following ground disturbance, and herbaceous vegetation is expected to be established within three growing seasons. About 45 percent of surface disturbance associated with well pad construction would be reclaimed after completion of the last well planned for the well pad, which would reduce some of the effects to wildlife. However, wildlife use of reclaimed surface disturbance would depend on many factors including species-specific responses to revegetated species, vegetation cover and density, and vegetation structure; wildlife use of reclaimed surfaces could take a long time.

**Zone of Effect.** Traffic is expected to affect pronghorn, mule deer, and elk distributions in occupied habitats for some distance away from Project components (well pads, roads). Mule deer generally avoid roads (Rost and Bailey, 1979; Easterly et al., 1991). Elk also avoid roads and traffic (Rost and Bailey, 1979; Lyon, 1983; Rowland et al., 2000) and pronghorn avoid disturbances associated with vehicular traffic, mines, and wellfields (Autenrieth, 1983; Reeve, 1984; Easterly et al., 1991).

Big game species tend to move away from areas of human activity and roads, reducing habitat utilization. Displacement of big game is greatest for heavily traveled secondary and dirt roads. Deer displacement distances can reach over 0.5 mile. Deer and pronghorn have been observed to habituate to vehicles as long as traffic is predictable, moving at constant speeds, and not associated with out-of-vehicle activities. In areas where habitats are at, or near, carrying capacity, animal displacement could result in some unquantifiable reductions in local wildlife populations.

Increased vehicular access could induce glucocortioid stress in animals (Creel et al., 2002; Sheriff et al., 2011) in the vicinity of well pads, roads and centralized facilities during periods in winter with no timing limitations. Chronic stress might lead to increased mortality. More likely would be increased mortality if animals, especially juveniles, increased their energy expense, especially travelling through snow during winter (Parker et al., 1984) while escaping from vehicles (Hobbs, 1989).

The presence of construction vehicles and pickup trucks is likely to displace pronghorns from home ranges and breeding territories in the vicinity of construction (Reeve, 1984). These effects are expected to be localized and temporary, perhaps lasting as long as the duration of construction although some animals could potentially habituate to consistent, confined, and predictable disturbances (Reeve, 1984). Densities of pronghorn on the Project Area are expected to be very low. The use of pronghorn would be associated with available water sources within the area. Displacement of pronghorns away from well pads and roads by surface disturbance, human presence, and traffic, if it occurs, would not affect many animals and the extent of summer habitat does not appear to be a limiting factor for the population. Displacement would not cause local habitat carrying capacity to be exceeded and would not lead to demographic effects to the pronghorn population by increasing mortality (e.g., through stress, predation, disease, or intraspecific competition), decreasing fecundity (e.g., through nutrition deficits during pregnancy and lactation, fetal resorption, fetal abortion), or by increasing emigration.

Other game and non-game wildlife would be expected to be temporarily displaced from home ranges by construction activities. Displaced individuals are often susceptible to increased predation, especially if they escape to habitats without suitable hiding cover.

Wildlife displacement can be a response to noise, although noise and human presence coincide so the effects of either may not be discernible. Most studies of noise effects on wildlife have been related to roads and traffic (reviewed in Federal Highway Administration, 2004). There is no single noise threshold that would apply to all wildlife, and species are affected and respond differently throughout the year during different stages in life cycles. Noise from construction and vehicle traffic (which would be greatest near the source of noise including construction equipment, drilling rigs, and completion rigs) would be detected by wildlife if above ambient background levels, assumed to be 30 dBA during daytime. Effects from noise could also mask approaching predators and mask vocalizations of all types which may reduce fitness.

Proposed well pads S-12J and R-18K would be located on leases that include stipulations for pronghorn antelope crucial winter range; however, NDOW updated the range boundaries in 2007 and there is currently no identified crucial winter range for pronghorn antelope in the Project Area. Should NDOW change the range boundaries designating this portion of the Project Area as crucial winter range, then the lease stipulations would be enforced.

## Fish

Construction of the Proposed Action could directly and/or indirectly affect aquatic species and habitats present in the Project Area by accidental release of diesel fuel, lubricants, and herbicides in aquatic habitats in the Project Area. Diesel fuel spills could affect freshwater stream macroinvertebrates for more than one year after a spill (Lytle and Peckarsky, 2001). Diesel fuels and lubricating oils are considerably more toxic to aquatic organisms than other, more volatile products (gasoline) or heavier crude oil (Markarian et al., 1994). Avoidance (by surface disturbance) of all streams, creeks, springs, and wetland areas by 400 feet and no fueling within 400 feet of these areas would minimize effects to aquatic species. Noble would implement a Spill Prevention Plan which would provide measures to prevent spills from reaching surface water. With implementation of these measures, native and non-native fish that might

occur in Tabor Creek, Burnt Creek, Bishop Creek, and the Humboldt River would not be affected by the Project.

Aquifers connected to the Humboldt River are unlikely to be deeper than a few hundred feet. Exploration activity would be at least 4,000 feet deeper than that and under an overburden containing shales, volcanic tuffs and limestones, which isolate the aquifers from the target zone(s). Based on the separation, the potential for impact to the aquifers, the Humboldt River, and aquatic life appears to be very remote.

**Mitigation Measures**

The BLM would require the following mitigation measures to further reduce potential impacts to wildlife and fisheries:

- Garbage should be removed at frequent intervals to avoid attracting scavengers and predators to the pad vicinities. No vehicles should be parked off pad or road disturbance to avoid contamination or fire starts. Employees must stay on pad areas for the duration of shift.
- Any direct mortality within the Project footprint should be reported immediately to the local NDOW Eastern Region Mining Biologist and/or local NDOW wildlife LE. For threatened and endanagered species, migratory birds, and eagles, the FWS must also be notified.
- The use of hunting equipment, calls, bow/arrow, traps, snares, firearms, baits, scents, etc. on site should be prohibited to deter poaching.

#### 3.3.5.2.2 No Action Alternative

Under the No Action Alternative, there would be no change from either the Proposed Action Alternative or the Visual Alternative to current conditions for game and non-game wildlife species or habitats within the Project Area.

#### 3.3.5.2.3 Visual Alternative

Effects to wildlife and fisheries under the Visual Alternative would be similar to those described above for the Proposed Action.

### 3.3.5.3 Cumulative Effects (Wildlife Resources)

The wildlife resources analyzed in the cumulative impacts section include Migratory Birds, Sensitive and Special Status Species, and Wildlife and Fisheries. The CESAs include areas that provide important seasonal habitat for wildlife species such as raptors, sage grouse, and pronghorn (see Table 3.3-15).

- Migratory Birds. Migratory birds encompass a number of different avian families with differing habitat needs. To ensure large scale coverage of all species' habitat needs, the CESA has been defined as the Upper Humboldt River Watershed. This CESA includes Sensitive and Special Status bird and bat species.
- General Wildlife and Sensitive and Special Status Species (excluding bird and bat species). The CESA for this group has been defined as the Upper Humboldt Watershed north of I-80. Mule deer habitat is considered limited use in the Project Area, and there are no elk populations associated with the Project Area.
- Sage Grouse. Sage grouse populations are managed by geographical areas referred to as PMU's. The entire Project Area is located in the O'Neil Basin PMU, and is defined as the sage grouse CESA.

- Pronghorn Antelope. The pronghorn CESA was developed to assess impacts from Project activities and other actions to Herd Units 072, 074, 075. Pronghorn habitat within the Project Area is classified by the BLM as summer range.

**Table 3.3-15**
**Cumulative Effects Study Areas**

| Resource | Total Acres within CESA | Description |
|---|---|---|
| Migratory Birds and Sensitive and Special Status Species | 1,078,218 | Upper Humboldt watershed (HUC160401) |
| General Wildlife (including Big Game) and Sensitive and Special Status Species | 689,177 | Upper Humboldt watershed (HUC160401) north of Interstate-80. |
| Sage Grouse | 1,014,670 | O'Neil PMU |
| Pronghorn Antelope | 1,177,094 | Herd Units 072, 074, 075. |

**Past, Present and Reasonably Foreseeable Actions**

Past and present actions in the wildlife CESAs include livestock grazing and range improvements, wildland fires, wildlife and game habitat management, fire treatment/seedings, recreation, railroads, utility and other rights-of-way), mineral exploration, oil and gas exploration, wind power, and mining. Table 3.3-16 summarizes current disturbances.

**Livestock Grazing and Range Improvements.** There are approximately 103 BLM-administered grazing allotments that are within or overlap the Wildlife CESAs. The largest being the Black Butte allotment which includes 51,408 acres. Range improvements within the range allotments include wells/storage tanks, reservoirs, pipelines, seedings, fences, spring/riparian exclosures, spring developments and noxious weed treatments.

**Wildland Fires.** There has been disturbance associated with wildland fires in all the Wildlife CESAs, ranging from about a quarter to a third of the acreage present. Table 3.3-16 also presents a breakdown of fire disturbances to individual habitat components for sage grouse and pronghorn. Over half of the sage grouse PGH habitat has been disturbed by fire, and over half of the pronghorn summer range has been affected.

**Mineral Exploration and Wind Power.** Mineral exploration and wind power projects create temporary and permanent disturbances. Table 3.3-16 summarizes energy projects currently listed within the CESAs.

**Rights-of-Way.** Rights-of-Way applications will continue to be submitted in the future. Data for the acres of RFFA ROWS in the CESAs are based on the LR2000 and proposed project information from the BLM.

**Wildlife and Game Habitat Management.** Research and management of big game and wildlife are undertaken by NDOW. The BLM manages wildlife habitat on public land, which may include modification to existing habitat and rangeland facilities. The Project Area is located in NDOW Hunt Unit 075. Big game population numbers and trends are discussed above. Wildlife and game habitat management activities are expected to continue consistent with the past and present actions discussion.

**Table 3.3-16**
**Summary of Habitat Disturbances within CESAs for Wildlife Resources**

| Resource | Total Acres within CESA | Acres Disturbed by Fire [1] | Acres Disturbed by Past, Present, and RFFA's [2] | | Total Acres Disturbance (%)[3] | Acres of Habitat Disturbed by Project |
|---|---|---|---|---|---|---|
| | | | Case Type | Acres Disturbance | | |
| Migratory Birds and Special Status Species | 1,078,218 | 253,756 (23.5%) | Rights-of-Way: Power lines, Fiber Optic Cable, Telephone Lines, Roads, Fences, Railroad, Wind Energy Facilities | 3,989.86 | 258,521.3 (24%) | 382 (0.01%) |
| | | | Mineral Material Sites Sand, Gravel, topsoil sources and pits, includes Nevada Department of Transportation pits | 775.43 | | |
| General Wildlife (including Big Game) and Sensitive and Special Status Species | 689,177 | 221,950 (32.2%) | Rights-of-Way: Power lines, Fiber Optic Cable, Telephone Lines, Roads, Fences, Railroad | 3,140.61 | 225,208.2 (33%) | 382 (0.01%) |
| | | | Mineral Material Sites: Sand, Gravel, topsoil sources and pits, includes Nevada Department of Transportation pits | 117.55 | | |
| Sage Grouse | BLM Habitat<br>PPH: 665,794<br>PGH: 41,092<br>NDOW Habitat<br>Essential: 464,455<br>Important: 429,394<br>Moderate: 68,713<br>Low: 48,277<br>**Total: 1,014,670** | BLM Habitat<br>PPH: 213,368 (32%)<br>PGH: 22,767 (55%)<br>NDOW Habitat<br>E: 41,674 (9%)<br>I: 239,594 (56%)<br>M: 28,838 (42%)<br>Low: 8,796 (18%)<br>**Total (BLM): 236,135** | Rights-of-Way: Power lines, Fiber Optic Cable, Telephone Lines, Roads, Fences, Railroad | 3,891.58 | 240,161.2 (24%) | BLM Habitat<br>PPH: 245 (0.04%)<br>PGH: 4 (0.01%)<br>NDOW Habitat<br>E: 40 (0.01%)<br>I: 313 (0.07%)<br>M: 29 (0.04%)<br>Low: 0 |
| | | | Mineral Material Sites: Sand, Gravel, topsoil sources and pits, includes Nevada Department of Transportation pits | 134.66 | | |
| Pronghorn Antelope | Crucial Summer: 37,974<br>Crucial Winter: 694<br>Summer: 822,789<br>Winter: 35,578<br>Yearlong: 2,033<br>**Total: 1,177,094** | Crucial Summer: 15,219 (54%)<br>Crucial Winter: 0<br>Summer: 163,393 (20%)<br>Winter: 8,092 (23%)<br>Yearlong: 0<br>**Total: 186,704** | Rights-of-Way: Power lines, Fiber Optic Cable, Telephone Lines, Roads, Fences, Railroad | 4,726.88 | 191,692.4 (16%) | Crucial Summer: 0<br>Crucial Winter: 0<br>Summer: 382<br>Winter Yearlong: 0 |
| | | | Mineral Material Sites: Sand, Gravel, topsoil sources and pits, includes Nevada Department of Transportation pits | 2,61.56 | | |

[1] Source: BLM GIS data. Historic Fires (1981-2008).
[2] Approximate acreage based on BLM LR2000 GeoReport database. Includes closed, authorized, and pending rights-of-way and surface management features.
[3] Because disturbance acres may overlap (i.e., fire with past/present/RFFAs), the total is a conservative estimate.

**Summary of Cumulative Effects**

**Migratory Birds.** Migratory birds (primarily passerine species plus waterfowl and shorebirds) are generally protected and/or avoided for any activities on public land, but may not be protected for actions on private land. Past, present, and reasonably foreseeable activities that could impact nesting habitats for migratory birds include: wildland fire, livestock grazing, proliferation of invasive and noxious weeds, oil and gas exploration, dispersed recreation (i.e., hunting, camping, etc.), and OHV use. Changes in vegetative structure can extend over the long-term. Regional data for three BCC that are sagebrush obligate species indicate their populations are declining. Cumulative effects, including the Proposed Action Alternative and the Visual Alternative and reasonably foreseeable actions, would contribute to habitat loss and/or alteration and may further affect populations of sagebrush obligate species. Habitats that are physically removed by the Project and habitats that become less functional to migratory birds because of human presence and noise contribute to cumulative habitat loss. Together, the effects of fires, past, present and RFFA have affected an estimated 50 percent of potential migratory bird habitats within the entire CESA. By comparison, cumulative effects by the Proposed Action would be limited to vegetation/habitat (approximately 382 acres) and would be small (approximately 0.1 percent) within the CESA (see Map 3.1-1) as provided in Table 3.3-16.

**Special Status Species.** Sensitive and Special Status Species are generally protected and/or avoided for any activities on public lands but may not be protected for actions on private lands unless they are actually federally-listed or state-protected. These species and several others (such as sagebrush-obligates) have been subjected to a long period of incremental habitat loss and conversion of native vegetation to vegetation dominated by invasive species has occurred throughout the CESA and has reduced the value of habitats to sagebrush associated wildlife species. Nearly all sensitive species would be affected by the past, present, and reasonably foreseeable future actions (i.e., wildland fire, livestock grazing, wind energy development, invasive and noxious weed proliferation, oil and gas exploration, dispersed recreation, OHV use, etc.) unless impacts are avoided or mitigated. Habitats that are physically removed by the Project and habitats that become less functional to sensitive species because of human presence and noise contribute to cumulative habitat loss. Together, the effects of fires, past, present and RFFA have affected an estimated 65 percent of potential sensitive species habitats within the entire CESA. By comparison, cumulative effects to Special Status Species would be limited to vegetation/habitat (approximately 382 acres) and would be small within the CESAs (see Map 3.1-1, Map 3.1-2, and Map 3.1-3) as shown in Table 3.3-15 and Table 3.3-16.

**Sage-Grouse.** Sage-grouse within the CESA have been affected in the past by actions that have altered sagebrush habitats including wildfire, livestock grazing, sagebrush treatments (chemical, mechanical), proliferation of invasive and noxious weeds, placement of aboveground structures used by predators, and other actions discussed above. Anthropogenic noise from various actions may have affected sage-grouse lek attendance and reproduction. Recruitment within the CESA has likely been affected by predation of adults, juveniles, and nests by species introduced by, tolerant of or associated with humans. In addition, drought conditions have probably adversely affected early brood-rearing habitats and the availability of forbs throughout the summer. These factors have likely contributed to the observed decline in sage-grouse productivity within the O'Neil Basin PMU during the past 10 years.

**Big Game.** Wildlife (game and non-game) would be affected by the past, present, and reasonably foreseeable future activities within the CESA (watershed north of Interstate-80 for wildlife and Herd Units 072, 074, 075 for pronghorn - see Map 3.1-2 and Map 3.1-4) because these species are found almost everywhere and are highly mobile. The primary effects to these species are direct habitat loss or conversion, habitat fragmentation, or disturbance during critical seasons (e.g., breeding, rearing of young, and critical wintering) of their lifecycles. Pronghorn

fawn recruitment within the CESA has been low and has likely contributed to limited population growth. Habitats that are physically removed by the Project and habitats that become less functional as seasonally used habitat because of human presence and noise contribute to cumulative habitat loss. Fires have affected an estimated 20 percent of potential pronghorn summer habitats within the entire CESA. By comparison, the Proposed Action would affect 0.04 percent of all summer range in the CESA. Cumulative effects, including the Proposed Action and reasonably foreseeable actions, could continue affecting pronghorn population growth (see Map 3.1-2 and Map 3.1-4).

**Small Mammals.** Past actions that have potentially impacted small mammal wildlife are the same as has been analyzed for special status species, include wildfire, mineral exploration, wind energy development, ranching operations (grazing), road construction or maintenance, or dispersed recreation that impacted water resources or reduced wildlife habitat in the CESA. (Refer to Special Status Species/Section 3.3.4 for analysis.) The RFFA's for small animal wildlife are the same as has been analyzed for special status species. Potential impacts to wildlife could occur from grazing, wild horses, dispersed recreation, roads, rights-of-way, minerals activities, oil and gas exploration or loss of wildlife habitat associated with future wildland fires. There are no specific data on the potential impacts that would result to small mammal wildlife as a result of dispersed recreation, grazing, or future wildfires.

## 3.4 HERITAGE RESOURCES AND HUMAN ENVIRONMENT

### 3.4.1 CULTURAL RESOURCES

#### 3.4.1.1 Current Conditions

A Class III Cultural Resource Inventory for the Project Area was conducted by Cultural Resource Analysts, Inc. (CRA) in 2012. The area of potential effect (APE) for purposes of the cultural resource survey is the geographical area or areas within which an undertaking may directly or indirectly cause changes in the character or use of cultural resources. The APE for the cultural Class III inventory was the proposed well pad locations and both proposed newly constructed and existing access roads slated for improvement (including the 2 roads extending outside the Project boundary). The inventory was completed under Cultural Resource Use Permit No. N-90625 and Nevada State Antiquities Permit No. 615, and BLM Project Number 1-2967. A previous cultural resource inventory was completed by CRA for the Marys River 3D Seismic Project under the same permit numbers stated above (BLM report # 1-2951(P)). The purpose of these inventories was to identify cultural resources, evaluate the eligibility of the resource for inclusion in the NRHP and to recommend specific avoidance strategies for NRHP eligible cultural resources.

An existing information inventory was completed for the APE to summarize the prehistoric, historic, and ethnographic nature of the archaeological resources in the region. Cultural properties identified in the vicinity of the Project Area include prehistoric lithic scatters and historic sites relating to exploration, transportation, and land usage. Subsistence and settlement and aspects of regional chronology are prehistoric themes reflected by the identified prehistoric sites. Documented historic sites relating to exploration and transportation in the area include segments of the California National Historic Trail, the Central Pacific Railroad grade, and the abandoned Southern Pacific Railroad spur to the town site of Metropolis. The Town of Metropolis was planned as a center of commerce surrounded by a farming district, and was subsequently abandoned. Additional sites include historic farmsteads and sites associated with agriculture land use activities.

Thirty-five potential well pad locations are identified from 40 original areas that were surveyed for cultural resources. A standard 20 acres was pre-planned for survey at each potential location

with 7 acres intended for initial development. The standard survey area was revised or relocated when adjustments to potential pad locations were made to avoid sensitive cultural and biological properties and to lessen the surficial landscape impacts. The number of well pad was adjusted down to 33 potential areas. In all, CRA surveyed a total of 2,596 acres, which includes the 61 miles of linear survey for the proposed access roads. A minimum 200-foot corridor was surveyed for road improvements or for the construction of new roads to access the exploration pads. CRA recorded both prehistoric and historic sites within the Project boundary. For this exploration Project, CRA also revisited two previously recorded historic linear sites. The CNHT is eligible for inclusion on the NRHP. The CNHT was previously documented by Fryman and Call (2011) as segments 35 and 36 for the purpose of management and preservation (Fryman and Call, 2011). The Central and Southern Pacific Railroads (CSPRR) are also eligible for inclusion on the NRHP.

The cultural resources inventory found both prehistoric and historic sites. Six cultural resource properties, including five sites and one isolate resource, were newly recorded during the cultural resource survey. These newly documented five sites were determined to be ineligible for the NRHP. Previously recorded sites in the Project Area were documented from the Marys River 3D Seismic Project (BLM report # 1-2951). Eighteen sites and eight isolated resources were previously documented (BLM report # 1-2951:124). Of those 18, three sites were determined eligible for the NRHP, and seven others were unevaluated. Sites which are unevaluated receive the same protections as eligible sites.

WCRM prepared a visual assessment of the Project Area (Morgan et al., 2013). The analysis was required by the BLM based on the presence the CSPRR which is located within the Project Area (see Maps 3.4-1 and 3.4-2, below). The goal of the analysis was to identify visual adverse effects of the Proposed Action on the CSPRR (see Figure 3.4-1).

The visual assessment consists of two portions: field assessment including photography and observation, and analysis. The field assessment of existing conditions utilizes photographic documentation and observation of the settings, locations, landscape, and viewsheds of historic properties in relation to the proposed Project infrastructure and development. Analysis consists of integrating descriptions of landscape components based on BLM Manual 8400 and Manual 6280, visual simulations, and computer-generated GIS viewsheds; evaluating effects under NTSA and NRHP; and finally, proposing recommendations to reduce the quantum of harm resulting from the proposed development to the historic properties (Morgan et al., 2013). The simulations reviewed effects of the proposed 20 ft. tanks and the lower profile 10 ft. tanks for the well pads.

Through this analysis it was determined that several of these developments would remain visible even with Project modification. Visibility itself does not equate to adverse effects or impacts. Per 36 CFR 800.5, assessment of adverse effects:

(1) Criteria of adverse effect. An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property.


**Figure 3.4-1**
**View to the Northeast from Central Pacific Railroad Grade**

The two pertinent examples of adverse effects listed in the criteria applicable to this Project are the following:

> (iv) Change of the character of property's use or of physical features within the property's setting that contribute to its historic significance;
>
> (v) Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features.

To create an adverse effect, a proposed project would need to change the character of the property's use or setting or introduce a visual or element that significantly diminishes the integrity of location, setting, feeling, or association. A project action simply being visible from the resource itself does not automatically qualify a well pad as having an adverse effect or impact. To assess if the visual effects created by the Project actions would be adverse or not, the Visual Contrast Rating system (BLM, 1986) was utilized. Where significant visual contrast introduced by proposed Project elements was found, adverse effect was identified. Where visual contrast was minimal, no adverse effect was identified even though proposed Project actions may be visible.

The railroad is strongly entwined with historic settle development in Nevada. In 1869, the Central Pacific Railroad (CPRR) was completed along the Humboldt River, giving rise to station towns like Lovelock, Winnemucca, Battle Mountain, Carlin, Elko, and Wells (Fryman and Call, 2011).

Beginning in Sacramento in 1863, the western portion of the transcontinental railroad was built by the CPRR. The eastern half, built by the Union Pacific Railway (UPRR), began construction in Omaha, Nebraska and joined with the CPRR at Promontory, Utah in May 1869. The CPRR was built through eastern Nevada between July 1868 and May 1869. Much of the CNHT between Wells and the Humboldt Sink now parallels the CPRR grade and is generally in close proximity, if not coincident with it (Fryman and Call, 2011). Towns such as Carlin, Elko, Deeth, and Wells were station stops along the CPRR. These communities quickly became residential centers for shipping livestock to the east. The Town of Metropolis, founded in 1910 as a dry-farming community, was accessed by a rail spur constructed by the Southern Pacific Railroad (SPRR). The rail spur was an offshoot of the original CPRR lines and ran north along the east side of Bishop Creek.

The CSPRR has significant cultural, scientific, recreational, and educational importance to an increasing number of visitors. Several specific user groups, including Union Pacific Historical Society, Nevada State Railroad Museum, Southern Pacific Historical and Technical Society, and Nevada Northern Railway Museum, have invested time and money into researching, advocating for, and utilizing the CSPRR for educational and recreational purposes.

The CNHT is discussed in further detail in Section 3.4.2.

#### 3.4.1.2 Environmental Consequences

##### 3.4.1.2.1 Proposed Action Alternative

Two previously recorded linear sites within the Project Area, including a segment of the California National Historic Trail and sections of the Central and Southern Pacific Railroads, have been recently surveyed and recorded (Hoffert et al., 2012a) and were revisited for this Project (Hoffert et al., 2012b). Both previously recorded sites are determined as eligible for inclusion in the NRHP under Criteria a, b, c and d. However, both of the historic properties have contributing and non-contributing elements. Only the contributing elements of these historic properties are eligible for the NRHP under Criteria a-d.

Fifteen of the documented sites and all the isolated resources are determined as not eligible for inclusion in the NRHP, so no mitigation is required. In a letter dated August 16, 2013, the State Historic Preservation Officer (SHPO) concurred with BLM's determinations of eligibility. Seven other sites related to dry farming and Metropolis were unevaluated for the NRHP. These sites will be avoided and treated as eligible sites during all proposed Project.

The newly recorded cultural resource properties have been avoided, regardless of eligibility, by pad relocation and expanded survey of selected well pads and access roads. Furthermore, segments of the previously recorded linear sites considered as contributing to eligibility are avoided with a cultural resource buffer area of at least 100 feet. One segment of the railroad berm (26EK9820, Segment S3) is presently used by recreationists and local ranchers as a two-track road to access the southern portion of the Project Area, west of Bishop Creek (Hoffert et al., 2012b). This railroad berm segment is considered as non-contributing to the eligible site. Because a major upgrade conforming to Gold Book standards would be required to the existing segment of berm/two track, Segment S3 was eliminated as a possible choice for infrastructure access. Additional cultural survey, outside the standard survey corridor, was completed to provide alternate routes for new road access away from the linear historic railroad grade.

With the implementation of the protective measures described below, no newly recorded historic properties would be directly affected by the Proposed Action. Implementation of the Project would provide increased access to the Project Area, which could increase the possibility for increased looting and vandalism. No new access within close proximity to these sites would be created thus lessening the possibility of increased visitation. NRHP eligible sites (California Trail, 26EK5150 and Central and Southern Pacific Railroad, 26EK9820) may be indirectly visually impacted by proposed infrastructure placement. A visual impact assessment conforming to BLM standards has been conducted.

Visual analysis was conducted for 33 well pad locations and 33 new access roads/existing roads slated for upgrade. Of the 33 proposed well pad locations, 21 were determined to have visual indirect adverse effects (see Table 3.4-1). Eighteen of the proposed 33 access roads or existing roads slated for upgrade would cause no indirect visual adverse effect if constructed or improved. The remaining 15 proposed access roads and existing roads slated for improvement would have indirect visual adverse effects upon the CSPRR (see Table 3.4-2).

**Table 3.4-1**
**Well Pad Visibility and Adverse Effects**

| Well Pad | Visibility CSPRR |
|---|---|
| N-25P | Not visible, no effects or impacts |
| O-31B | Visible, no adverse effects or impacts |
| O-31O | Visible, no adverse effects or impacts |
| O-32J | Visible, no adverse effects or impacts |
| O-34K | Visible, adverse effects or impacts |
| R-3M | Visible, adverse effects or impacts |
| R-4A | Visible, adverse effects or impacts |
| R-4F | Visible, access road adverse effect |
| R-6P | Not visible, no effects or impacts |
| R-7B | Not visible, no effects or impacts |
| R-7P | Not visible, no effects or impacts |
| R-8J | Not visible, access road adverse effect |
| R-9A | Visible, adverse effects or impacts |

| Well Pad | Visibility CSPRR |
|---|---|
| R-9G | Visible, adverse effects or impacts |
| R-10N | Visible, adverse effects or impacts |
| R-14E | Visible, adverse effects or impacts |
| R-17A | Visible, adverse effects or impacts |
| R-17J | Visible, adverse effects or impacts |
| R-18K | Visible, no adverse effects or impacts |
| R-20G | Visible, adverse effects or impacts |
| R-20J | Visible, adverse effects or impacts |
| R-21A | Visible, adverse effects or impacts |
| R-21K | Visible, adverse effects or impacts |
| R-27F | Visible, adverse effects or impacts |
| R-27I | Visible, adverse effects or impacts |
| R-27M | Visible, adverse effects or impacts |
| R-29L | Visible, adverse effects or impacts |
| R-30J | Visible, adverse effects or impacts |
| S-1B | Visible, no adverse effects or impacts |
| S-1J | Visible, no adverse effects or impacts |
| S-12J | Visible, no adverse effects or impacts |
| S-13P | Not visible, no effects or impacts |
| S-25G | Visible, adverse effects or impacts |

**Table 3.4-2**
**Access Roads and Existing Road Effects**

| Access Road | Visibility/Effect |
|---|---|
| AR O-31B | Not Adverse |
| AR O-32J | Not Adverse |
| AR O-34K | Not Adverse |
| AR N-25P | Not Adverse |
| AR R-4A | Not Adverse |
| AR R-4F | Not Adverse |
| AR R-6P | Not Adverse |
| AR R-7B | Not Adverse |
| AR R-8J | Not Adverse |
| AR R-9G | Adverse |
| AR R-10N | Adverse |
| AR R-14E | Adverse |
| AR R-17J | Adverse |
| AR R-18K | Not Adverse |
| AR R-20G | Adverse |
| AR R-27F | Adverse |
| AR R-27I | Adverse |

| Access Road | Visibility/Effect |
|---|---|
| AR R-27M | Adverse |
| AR R-29L | Adverse |
| AR R-30J | Adverse |
| AR S-1B | Not Adverse |
| AR S-1J | Not Adverse |
| AR S-12J | Not Adverse |
| AR S-13P | Not Adverse |
| AR S-25G | Adverse |
| AR S-25G 2 | Adverse |
| ER 1 | Not Adverse |
| ER 2 | Adverse |
| ER 3 | Adverse |
| ER 4 | Not Adverse |
| ER 5 | Adverse |
| ER 6 | Not Adverse |
| ER 7 | Not Adverse |

Potential adverse effects and impacts to the CNHT are described in Section 3.4.2.

**Mitigation Measures**

Under the Proposed Action Alternative, no mitigation to historic properties is proposed.

#### 3.4.1.2.2 No Action Alternative

Under the No Action Alternative, neither the Proposed Action Alternative nor the Visual Alternative would occur and therefore, no direct or indirect impacts to cultural resources would result from increased access. Illegal collection and vandalism could still occur although access would not be increased.

#### 3.4.1.2.3 Visual Alternative

Potential effects to cultural resources under the Visual Alternative would be similar to those described above for the Proposed Action but any potential impacts associated with well pads R-27M, R-27F, R-27I, R-21K, R-21A, and R-10N would not occur because those well pads and associated access roads would not be constructed.

To minimize indirect visual adverse effects to the CSPRR, under the Visual Alternative, the design-related mitigative measures and minimization techniques recommended for 21 well pads in the audio and visual assessment (Morgan et al., 2013) would be implemented. Six wells pads (R-10N, R-21A, R-21K, R-27F, R-27I, and R-27M) and associated access roads recommended for abandonment would not be constructed. The design-related mitigative measures and minimization techniques include the following:

A) Abandon the location.

B) Move the well pads to specified locations within the 20-acre block (Morgan et al., 2013).

C) Utilize low-profile 10 ft. tall tanks and well pad equipment instead of the standard 20 ft. tall tanks.

D) Paint tanks and well pad equipment either Shale Green or Beetle (BLM, 2008) to blend in with the surrounding landscape.

E) Minimize vegetation disturbances, by leaving areas of vegetation in place if possible, and reseeding during interim reclamation and not just final reclamation.

F) Utilize an earthen berm or bank as a screen with the topsoil stockpile strategically located between the resources and the well pad equipment.

G) Round the well pad corners and create irregular trapezoidal shapes during the blading of the well pad rather than linear and rectilinear forms, which create a strong contrast.

Adherence to these specific mitigative measures does not equate to no adverse effect on the CSPRR. For purposes of this EA, a historic property is defined as any cultural resource that qualifies for listing on the NRHP or which has not yet been evaluated for the NRHP. Because the entire Proposed Action has been determined to constitute a single federal undertaking under the NHPA, these mitigation measures would apply to the entire Project Area.

- A 164-foot (50 meter) buffer zone should be established around the CSPRR within the Project Area to provide protection to the linear site during construction and exploration. Historic properties and their buffer zones would be off limits to all ground disturbing activities, including but not limited to driving, parking, grading/blading, excavation, equipment or supply storage, or any other activity that can break, damage, disturb or move archaeological deposits. Any such activities should be prohibited unless authorized in writing by the BLM Authorized Officer.
- A 164-foot (50 meter) buffer zone should be established around all archaeological sites that are either eligible for the NRHP or were unevaluated for eligibility for inclusion on the NRHP during recordation.
- Noble should not disturb, alter, injure or destroy any scientifically important paleontological remains; or any historical or archaeological site, structure, building, object or artifact within the Project Area. Noble should be responsible for ensuring that its employees, contractors or any others associated with the Proposed Action do not collect artifacts, or damage or vandalize archaeological, historical or paleontological sites or the artifacts within them. Should damage to cultural resources occur within the above areas during the period of construction, operation, maintenance or rehabilitation due to the unauthorized, inadvertent or negligent actions of Noble or any other Project personnel, Noble should be responsible for costs of rehabilitation or mitigation. Individuals involved in illegal activities would be subject to penalties under the Archaeological Resources Protection Act (16 United States Code [U.S.C.] 470ii), the FLPMA (43 U.S.C. 1701), the NAGPRA (16 U.S.C. 1170) and other applicable statutes.
- Noble should provide training to ensure that all its personnel and all the personnel of its contractors and subcontractors are directed not to engage in the illegal collection of historic and prehistoric materials. Subsequent hires should also be required to be subject to similar training. Training can be in association with Noble's safety and or related job training and Project orientation. Noble should cooperate with the BLM to ensure compliance with the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470) on Federal lands and with Nevada Revised Statutes (NRS) 381 and 383 for private lands.
- An archaeological monitor, funded by Noble, should be required during active construction at historic properties located within close proximity to ground disturbing

activities. The BLM would make determinations regarding monitoring needs on a case-by-case basis.

- When previously unidentified cultural resources are discovered or an unanticipated impact situation occurs, all Marys River Oil and Gas Exploration related activities within 328 feet (100 meters) of the discovery/impact should cease immediately and Noble or its authorized representative should secure the location to prevent vandalism or other damage. Pursuant to 43 CFR §10.4(g), Noble should the BLM Authorized Officer, by telephone and with written confirmation, immediately upon the discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony (as defined in 43 CFR § 10.2), and any previously undocumented archaeological, historic or paleontological sites. Activity at the location should be suspended until after the discovery has been evaluated, any necessary mitigation measures completed and the BLM Authorized Officer has issued a written Notice to Proceed. Human remains, funerary objects, sacred objects, or objects of cultural patrimony found on federal land should be handled according to the provisions of Native American Graves Protection and Repatriation Act (NAGPRA) and its implementing regulations (43 CFR § 10). Human remains and funerary objects found on state or private land should be handled according to the provisions of NRS 383.150 to 383.190.

Specific BMP's for unsurveyed portions of the Marys River Oil and Gas Exploration Project:

- Operators should not knowingly disturb, alter, injure, or destroy any scientifically important paleontological remains; or any historical or archaeological site, structure, building or object; or cave related site on public lands. When the operator discovers any previously unidentified cultural, paleontological, or cave related resource that might be altered or destroyed by the operations, the operator should immediately stop all activities in the vicinity of the discovery and the discovery should be left intact and reported to the Elko Field Office (BLM Authorized Officer), which should evaluate the discoveries, take action to protect, remove or preserve the resource within 30 working days (43 CFR 3809.420). 14. Pursuant to 43 CFR 10.4(g), the operator should notify the BLM Authorized Officer, by telephone, with written confirmation, immediately upon the discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony (as defined in 43 CFR 10.2). Further pursuant to 43 CFR 10.4(c) and (d), the operator should immediately stop all activities in the vicinity of the discovery and protect it for 30 days or until notified to proceed by the BLM Authorized Officer.
- Pending BLM formal acceptance of cultural resource survey and reporting of the historic town site of Metropolis, no travel should be authorized on the BLM road crossing T. 39 N, R. 61 E, Sections 26, 34, and 35.
- A BLM-approved monitor, funded by Noble, should be on site during any construction improvements to the road passing through T. 38 N, R. 61 E, Section 11 which has not been subject to prior cultural resource survey.

#### 3.4.1.3 Cumulative Effects

Often times, cultural resources may be affected by continued or increased human presence (i.e., illegal collection and vandalism). Construction of access roads and improving existing roads may increase access to previously inaccessible locations, increasing the likelihood that prehistoric and historic sites could be looted. As described above, the Project would avoid cultural resources; therefore, there would be no incremental increase in direct cumulative effects within the CESA. Indirect cumulative effects could arise from visual impacts associated with proposed infrastructure placement.

### 3.4.2 THE CALIFORNIA NATIONAL HISTORIC TRAIL

#### 3.4.2.1 Current Conditions

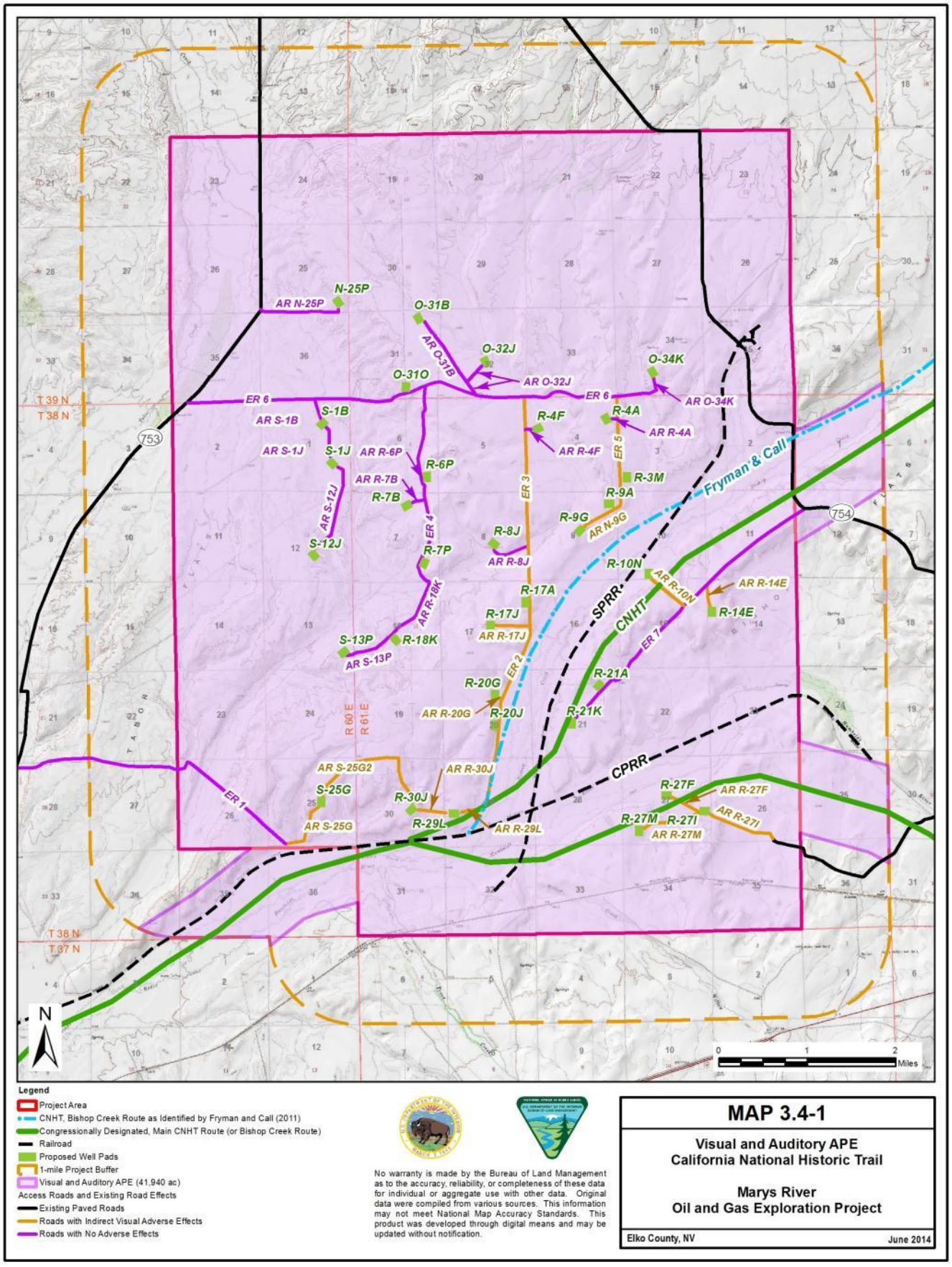
In 2012, CRA conducted a Class III cultural resources inventory (BLM Permit No. N-90625) including the proposed 33 well pads and 33 access roads/existing roads slated for improvement totaling 2,596 acres (including public and private lands) for the Marys River Exploration Project (BLM report # 1-2967). A previous cultural resource inventory was completed by CRA for the Marys River 3D Seismic Project under the same permit numbers stated above (BLM report # 1-2951(P)). The purpose of these inventories was to identify cultural resources, evaluate the eligibility of the resource for inclusion in the National Register of Historic Places (NRHP) and to recommend specific avoidance strategies for NRHP-eligible cultural resources. CRA recorded both prehistoric and historic sites within the Project boundary. For this exploration Project, CRA also revisited two previously recorded historic linear sites. The CNHT is eligible for inclusion on the NRHP under Criteria a, b, c and d. This historic property has both contributing elements and non-contributing elements; however, only the contributing elements are eligible for the NRHP under Criteria a, b, c and d. The CNHT was previously documented by Fryman and Call (2011) as segments 35 and 36. For the purpose of management and preservation, Fryman and Call (2011:5-2) classified trail sections C1-C3 as *"segments that generally retain sufficient integrity to support overall significance of the CNHT."* Classifications C4 and C5 generally lack integrity of feeling and association, or even historic location (C5). While Section 35 is classified as "C1" and about the first 1/3 of a mile of section 36 is classified as "C1", while the remainder drops off to "C3" then "C5" classifications. CRA recommended that CNHT be avoided by a 50-meter buffer. Additionally, the National Park Service (NPS) has classified this section of trail as the Granite Pass to Humboldt River (segment # 14) in the CMP, as "a high potential segment." High potential segments are defined as *"which would afford a high-quality recreation experience in a portion of the route having greater than average scenic values or affording an opportunity to vicariously share the experience of the original users of a historic route. National Historic Trail high potential route segments are assumed to contain remnants, artifacts, and other properties eligible for the National Register of Historic Places, pending evaluation.*"

To further assess indirect effects to the CNHT, WCRM prepared a visual and auditory assessment of the Project Area (Morgan et al., 2013). The goal of the analysis was to identify indirect auditory and visual adverse effects of the Proposed Action which could alter the setting, feeling, integrity of location, and association on the CNHT as required under Section 106 of the NHPA and effects to the visitor experience as part of the NTSA (6280 manual).

The APE in which visual impacts and effects were considered is 41,940 acres. The APE was defined as the Project Area plus a one-mile buffer extension along three areas of the CNHT (see Map 3.4-1).

The CNHT (including all routes and cutoffs) extends for nearly 5,700 miles from Independence and Saint Joseph, Missouri, and Council Bluffs, Iowa, to various points in California and Oregon. Segments of the CNHT were first used by Native Americans and later by early trappers and explorers in the late 1820's. Once gold was discovered at Sutter's Mill in 1848, the CNHT was utilized as one of the largest overland migration routes in America's westward expansion. An estimated 250,000+ emigrants utilized the trail during the height of the migration between 1849 and 1853 (Brock and Buck, 2010 and 2012).

The CNHT extends through the southeastern third of the Project Area in three distinct linear corridors. One of these corridors is a congressionally designated route. The other two corridors are associated with the Bishop Creek Route. Fryman and Call (2011) during their Class III Inventory and Assessment of the CNHT in the Elko District, identified the more probable corridor of the Bishop Creek route (see Map 3.4-2). All three routes are considered for analysis within the current Project's APEs.




**Legend**

- Project Area
- CNHT, Bishop Creek Route as Identified by Fryman and Call (2011)
- Congressionally Designated, Main CNHT Route (or Bishop Creek Route)
- Railroad
- Proposed Well Pads
- 1-mile Project Buffer
- Visual and Auditory APE (41,940 ac)

Access Roads and Existing Road Effects

- Existing Paved Roads
- Roads with Indirect Visual Adverse Effects
- Roads with No Adverse Effects

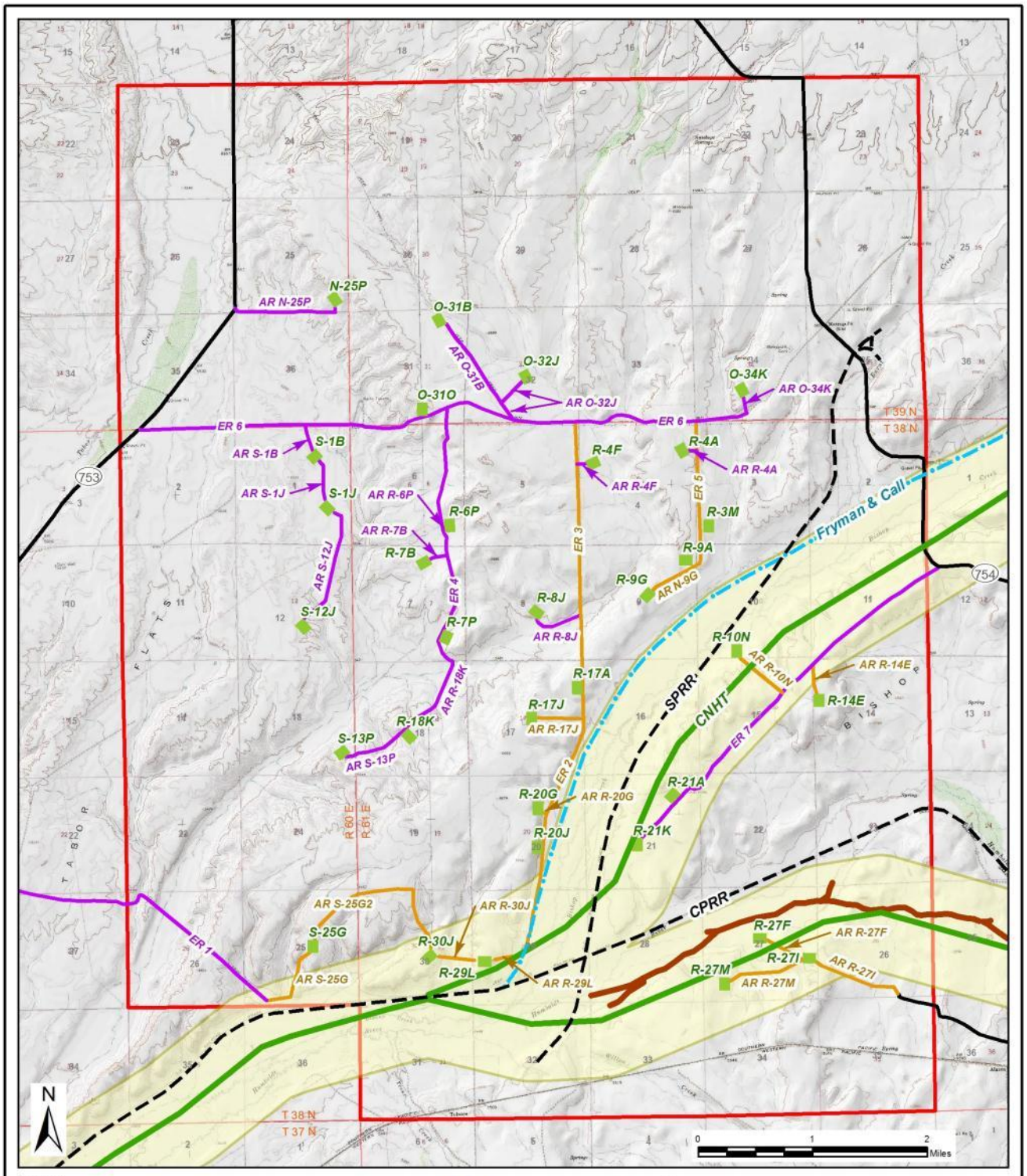
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

## MAP 3.4-1

**Visual and Auditory APE**
**California National Historic Trail**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014




**Legend**

- Project Area
- CNHT, Bishop Creek Route as Identified by Fryman and Call (2011)
- Congressionally Designated, Main CNHT Route (or Bishop Creek Route)
- Main CNHT Route, Extant Sections
- Railroad
- Proposed Well Pads
- CNHT Trai Analysis Corridor
- Existing Paved Roads
- Roads with Indirect Visual Adverse Effects
- Roads with No Adverse Effects



## MAP 3.4-2

**California National Historic Trail and Central and Southern Pacific Railroads**

**Marys River Oil and Gas Exploration Project**

Elko County, NV — June 2014

The CNHT is protected by several federal laws, regulations, and policy manuals on public lands. Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended) requires Federal agencies to take into account the effects of their undertakings on historic properties and afford the Council (Advisory Council of Historic Preservation) a reasonable opportunity to comment on such undertakings. The CNHT is considered a historic property and has been determined as eligible for inclusion to the NRHP. For a historic property to be eligible for the NRHP, it must possess integrity of location, design, setting, materials, workmanship, feeling, and association and based on one or more of four criteria (a, b, c, and d). The CNHT is eligible under the above definitions and all four criteria a-d.

The BLM must take into account the effects (direct and indirect) on historic properties for the Proposed Action. Effects for such a Project/undertaking can be considered into two categories 1) no adverse effect(s) or 2) adverse effect(s). The criteria for an adverse effect (36 CFR 800.5) are used to evaluate the effects of any impact on a historic property such as the CNHT. An adverse effect can be either direct (i.e. physical destruction of or damage to all or part of a historic property) or indirect (i.e. introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features). If the criteria of an effect indicate that an adverse effect(s) may occur, mitigation of that effect(s) may be required.

The CNHT is also federally protected under the National Trails System Act (NTSA) of 1968 (as amended). The NTSA was enacted "*to provide for the ever-increasing outdoor recreation needs of an expanding population and in order to promote the preservation of, public access to, travel within, and enjoyment and appreciation of the open-air, outdoor areas and historic resources of the Nation, trails should be established (i) primarily, near the urban areas of the Nation, and (ii) secondarily, within scenic areas and along historic travel routes of the Nation which are often more remotely located* (NTSA Sec. 2.a)." The CNHT was designated by an act of congress as a National Historic Trail in 1992. The NTSA designates that National historic trails shall "*follow as closely as possible and practicable the original trails or routes of travel of national historic significance. Designation of such trails or routes shall be continuous, but the established or developed trail, and the acquisition thereof, need not be continuous onsite. National historic trails shall have as their purpose the identification and protection of the historic route and its historic remnants and artifacts for public use and enjoyment* (NTSA Sec. 3.3)."

The BLM has implemented the 6280 Manual, "Management of National Scenic and Historic Trails and Trails Under Study or Recommended as Suitable for Congressional Designation (Public)," to direct the implementation of the NTSA on BLM managed lands. Under Manuel 6280, the purpose of a National Historic Trail is the identification and protection of the historic route and the historic remnants and artifacts for public use and enjoyment. A National Historic Trail is managed to recognize the nationally significant resources, qualities, values, and associated settings of the areas through which such trails may pass, including the primary use or uses of the trail. Federal Protection Components associated with the National Historic Trail, including high potential historic sites, high potential route segments, and auto tour routes are identified by the National Trail administering agency through the trail-wide Comprehensive Plan. Properties eligible for the NRHP, which may also be Federal Protection Components, may be identified along the National Historic Trail, including segments of the National Historic Trail.

The NPS has completed a Comprehensive Management and Use Plan (CMP) which details the purpose and significance of the trail along with issues and concerns related to management, use, protection, and recreation. The purposes of the CNHT as identified in the CMP are to "*enable all people to envision and experience, in a coherent and convenient way, the heritage and impacts of the western overland migration and encourage preservation of its history and physical remains*" (NPS, 1999:25). The segment of the CNHT which is located within the Project Area has been identified under this CMP as the "Granite Pass to Humboldt River segment of the

CNHT (No. 14)" and is categorized as a "high potential segment" (NPS 1999:11). The definition of a "high potential segment" is provided in the glossary of terms of Manuel 6280 (G-3:H), "*segments of a trail which would afford a high-quality recreation experience in a portion of the route having greater than average scenic values or affording an opportunity to vicariously share the experience of the original users of a historic route. National Historic Trail high potential route segments are assumed to contain remnants, artifacts, and other properties eligible for the National Register of Historic Places, pending evaluation. Under the National Trails System Act, high potential route segments located on federally owned land are referred to as Federal Protection Components*."

The CNHT has significant cultural, historical, recreational, and educational values of importance to an increasing number of visitors. Several specific user groups, including the Oregon-California Trails Association, Trails West Inc., California Trail Interpretive Center have invested time and money into researching, advocating for, and utilizing the CNHT for educational and recreational purposes.

#### 3.4.2.2 Environmental Consequences

##### 3.4.2.2.1 Proposed Action Alternative

The effects to the CNHT were analyzed for the proposed Project Area's APE (see Map 3.4-1) WCRM prepared a visual and auditory assessment of the Project Area (Morgan et al., 2013). The goal of the analysis was to identify indirect auditory and visual adverse effects of the Proposed Action which could alter the setting, feeling, integrity of location, and association on the CNHT as required under Section 106 of the NHPA and effects to the visitor experience as part of the NTSA (6280 manual).

The visual assessment consists of two portions: field assessment (including photography and observation), and analysis. The field assessment of existing conditions utilizes photographic documentation and observation of the settings, locations, landscape, and viewsheds of historic properties in relation to the proposed Project infrastructure and development. Analysis consists of integrating descriptions of landscape components based on BLM Manual 8400 and Manual 6280, visual simulations, and computer-generated GIS viewsheds; evaluating effects under NTSA and NRHP; and finally, proposing recommendations to reduce the quantum of harm resulting from the proposed development to the historic properties (Morgan et al., 2013). The simulations also analyzed minimizing effects in several ways including: using lower profile 10 ft. tanks for the well pads (vs the standard 20 ft.), moving the well pad locations, and abandonment (see Figure 3.4-2).

Through this analysis it was determined that several of these developments would remain visible even with Project modification. Visibility itself does not equate to adverse effects or impacts. Per 36 CFR 800.5, assessment of adverse effects:

(1) Criteria of adverse effect. An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property.

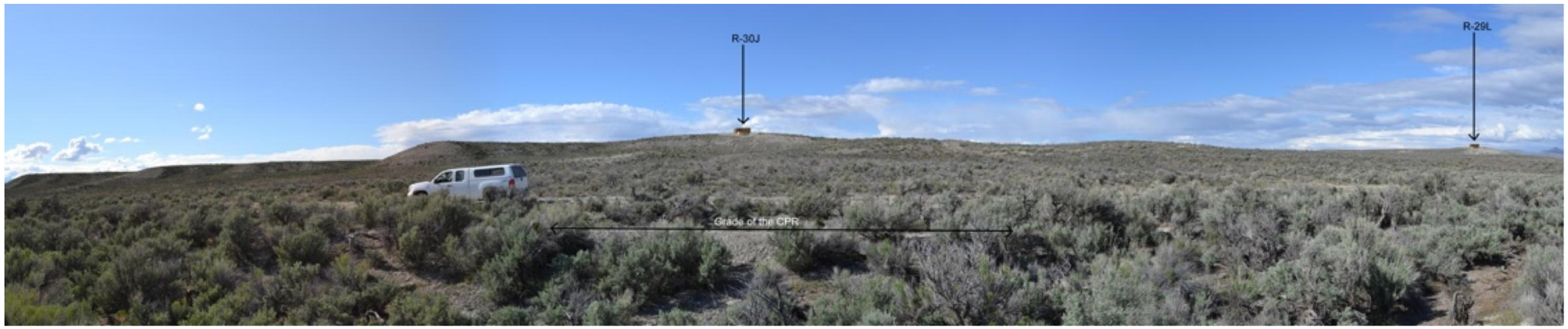



**Figure 3.4-2**
**View to the North from the Congressionally Delegated CNHT Corridor**

The two pertinent examples of adverse effects listed in the criteria applicable to this Project are the following:

> (iv) Change of the character of property's use or of physical features within the property's setting that contribute to its historic significance;
>
> (v) Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features.

To create an adverse effect, a proposed project would need to change the character of the property's use or setting or introduce a visual or audible element that significantly diminishes the integrity of location, setting, feeling, or association. A project action simply being visible from the resource itself does not automatically qualify a well pad as having an adverse effect or impact. To assess if the visual effects created by the Project actions would be adverse or not, the Visual Contrast Rating system (BLM, 1986) was utilized. Where significant visual contrast introduced by proposed Project elements was found, adverse effect was identified. Where visual contrast was minimal, no adverse effect was identified even though proposed Project actions may be visible.

Visual and auditory analysis was conducted for 33 well pad locations and 33 new access roads/existing roads slated for upgrade. Of the 33 proposed well pad locations, 21 were determined to have visual indirect adverse effects (see Table 3.4-1 and Map 3.4-2). Eighteen of the proposed 33 access roads or existing roads slated for upgrade would cause no indirect visual adverse effect if constructed or improved. The remaining 15 proposed access roads and existing roads slated for improvement would have indirect visual adverse effects upon the CNHT (see Table 3.4-2 and Map 3.4-2).

The auditory assessment portion of the Project consisted of the utilization of baseline auditory data for the Project Area, assessment of the decibel encroachment generated by the Project, and analysis and creation of models to reflect potential auditory conditions created by the Project (Morgan et al., 2013). Decibel encroachment levels for both the drilling/completion and production phases of the Project Area were modeled at Key Auditory Points along the CNHT. Although WCRM recommended that there would be no indirect auditory adverse effect from the proposed Project on the CNHT, the BLM and Nevada SHPO both concurred that well pads R-10N, R-21A, R-21K, R-27F, R-27I, and R-27M would have indirect auditory and visual adverse effects.

**Mitigation Measures**

Under the Proposed Action Alternative, no mitigation of adverse effects to the CNHT is planned.

#### 3.4.2.2.1 No Action Alternative

Under the No Action Alternative, well pads and associated access roads would not be constructed and there would be no effect or impacts to the CNHT resulting from the Proposed Action Alternative or Visual Resources Alternative.

#### 3.4.2.2.2 Visual Alternative

To address indirect visual adverse effects to the CNHT, under the Visual Alternative, the design-related mitigative measures and minimization techniques recommended for 21 well pads in the audio and visual assessment (Morgan et al., 2013) would be implemented. Six wells pads (R-10N, R-21A, R-21K, R-27F, R-27I, and R-27M) and associated access roads recommended for abandonment would not be constructed. The design-related mitigative measures and minimization techniques include the following:

A) Abandon the location.

B) Move the well pads to specified locations within the 20-acre block (Morgan et al., 2013).

C) Utilize low-profile 10 ft. tall tanks and well pad equipment instead of the standard 20 ft. tall tanks.

D) Paint tanks and well pad equipment either Shale Green or Beetle (BLM, 2008) to blend in with the surrounding landscape.

E) Minimize vegetation disturbances, by leaving areas of vegetation in place if possible, and reseeding during interim reclamation and not just final reclamation.

F) Utilize an earthen berm or bank as a screen with the topsoil stockpile strategically located between the resources and the well pad equipment.

G) Round the well pad corners and create irregular trapezoidal shapes during the blading of the well pad rather than linear and rectilinear forms, which create a strong contrast.

Table 3.4-3 provides a summary of BLM's determinations for avoidance and minimization of indirect adverse effects on the CNHT by proposed well pad. Recommendations/Mitigation indicated as "A through G" indicates mitigative measures and minimization techniques described above. Recommendations/Mitigation indicated as "h" refers to non-design or compensatory mitigation.

**Table 3.4-3**
**Summary of BLM's Determinations/Mitigation by Well Pad**

| Proposed Well Pad | Mitigation |
|---|---|
| 0-34K | C, D, E, G, and/or h |
| R-3M | C, D, E, G, and/or h |
| R-4A | C, D, E, G, and/or h |
| R-4F | h |
| R-8J | h |
| R-9A | C, D, E, G, and/or h |
| R-9G | C, D, E, G, and/or h |
| R-10N | A; discuss with BLM for other options |
| R-14E | B, C, D, E, G, and/or h |
| R-17A | C, D, E, G, and/or h |
| R-17J | C, D, E, G, and/or h |
| R-20G | B, C, D, E, F, G, and/or h |
| R-20J | B, C, D, E, F, G, and/or h |
| R-21A | A; discuss with BLM for other options |
| R-21K | A; discuss with BLM for other options |
| R-27F | A; discuss with BLM for other options |
| R-27I | A; discuss with BLM for other options |
| R-27M | A; discuss with BLM for other options |
| R-29L | B, C, D, E, G, and/or h |
| R-30J | B, C, D, E, G, and/or h |
| S-25G | B, C, D, E, F, G, and/or h |

In addition, per Manual 6280, "Mitigation includes rectifying, reducing, or eliminating the impact over some time and/or compensating for the impact by replacing or providing substitute resources or environments." Compensatory measures could be used in combination with or in place of other recommended techniques. Types of compensatory measures include educational opportunities and involvement, interpretive projects, and displays. Compensatory off-site

mitigation for indirect visual adverse effects to the CNHT is currently under development at the BLM Elko District with the SHPO, ACHP, NPS, Noble Energy, California Trails Interpretive Center, and Oregon and California Trails Association (OCTA). This plan is the Trails Regional Mitigation Plan (TRMP), which will address off-site compensatory mitigations commensurate to the indirect visual effect on the CNHT. The funds will be placed into an account and a board will be established on how to spend those funds to improve the CNHT. All projects funded through the TRMP will be subject to NEPA and used for the CNHT exclusively. A Memorandum of Agreement (MOA) will be developed between the BLM and the SHPO (along with the National Park Service and other interested parties), which will include the appropriate steps to mitigate the adverse effects.

Under the TRMP Non-design or compensatory mitigative measures that could be considered include (but are not limited to) the following:

a) Utilize roads that will be upgraded by Project activities to facilitate better access to segments of the trail with additional signage and interpretive displays.

b) Work with the California Trail Interpretive Center to provide additional educational opportunities and interpretive projects through financial and data contributions.

c) Develop visitor resources at locations of the CNHT that are located outside the Project Area but on accessible, BLM-managed land within the vicinity of the greater Project Area.

d) Take LIDAR (light detection and ranging) photographs of the trail routes to facilitate identification of unknown extant sections of the CNHT within the Project Area.

e) Provide resources for additional signage and information about the trail, and publish the data generated by the Project relevant to the CNHT to disseminate additional information concerning the trail.

f) Develop educational opportunities relating to the CNHT through web–based learning modules and/or lesson plans for teachers to utilize.

g) Create an exhibit at the Nevada State Museum that relates to the CNHT.

h) Develop booklets or handouts designed by Noble and approved by all parties on the CNHT.

i) Produce a documentary on the CNHT in collaboration with the Archaeological Channel through the University of Oregon.

Thirty-three access roads/existing roads slated for upgrade are proposed for this Project. Of the 33 roads, four are proposed for abandonment (AR R-10N, AR R-27F, AR R-27I, and AR R-27M). Eleven other access roads/existing roads slated for improvement would be mitigated through the TRMP as discussed above. The remaining 18 access road/existing roads slated for improvement would have no indirect visual adverse effects and no mitigation would be required.

The mitigations identified in this section would address the indirect visual adverse effects to the CNHT. The overall indirect visual adverse effects would still exist although they would be temporary in nature. If wells proceed into production, the effects could span up to 20 years, however this is still considered to be a temporary effect. Under the Visual Alternative, Noble would be an invited signatory for the above mentioned MOA.

#### 3.4.2.3 Cumulative Effects

Cumulative effects to the CNHT within the CESA (see Map 3.1-5) include: urban development, wildland fire management, Interstate 80, the Union Pacific Railroad, and county roads. These

types of development could cause direct impacts due to the loss of segments of the CNHT. Two tracks across the landscape, power lines, OHV use, and aircraft could cause indirect audio and visual adverse effects to the CNHT.

In the past, the Central Pacific Railroad (CPRR) followed the same route as the California Trail through Nevada. In some cases, it was constructed on top of the CNHT. Interstate 80 was constructed in the same area as the CNHT, and like the CPRR, in some areas, the highway was constructed over the CNHT. Presently, there are segments of the CNHT that are in pristine condition with no effects other than the general degradation through time and weathering. Future possible effects to the CNHT could come from domestic oil and gas exploration and production. In summary, the CNHT has been affected over time from human engineered transportation projects, ranching, farming, and other effects as listed above. Ultimately, it becomes a difficult task to fully protect nearly 5,700 miles of a linear trail. The CNHT has well documented segments and segments considered to be of "high potential" that will continue to be protected from future cumulative effects.

All of the above mentioned effects would continue to occur under the No Action Alternative.

As described above, the Project would have an effect on the CHNT; however, with implementation of protective measures described above, cumulative effects to the CNHT are expected to be minimal under the Visual Alternative.

The cumulative impacts under the Proposed Action would be substantially higher because the Project design features (tank height, abandonment, painting, etc.) and off-site mitigation would not occur.

### 3.4.3 NATIVE AMERICAN TRADITIONAL VALUES

#### 3.4.3.1 Current Conditions

Various tribes and bands of the Western Shoshone have stated that federal projects and land actions can have widespread effects to their culture and religion as they consider the landscape as sacred and as a provider. The Project Area is located within the traditional territory of the Western Shoshone.

Tribal participants of the Wells Band of Western Shoshone are aware of the Project through the BLM's notification process, and have been provided the opportunity for additional Government to Government consultation. Letters, dated December 18, 2012, requesting comment and consultation on the Proposed Action were sent to the following tribes or tribally affiliated organizations (listed alphabetically below). Additional communication regarding this EA and the proposed Project were sent to the Tribal groups on April 15, 2014. The BLM met with the Te-Moak Tribal Council on May 7, 2014 and the Wells Band Council on May 12, 2014 to discuss the proposed Project. The BLM will be involved in ongoing information sharing with the Wells Band Council for the duration of the Project.

- Battle Mountain Band Council
- Bureau of Indian Affairs
- Confederate Tribes of the Goshute Indian Reservation
- Duckwater Shoshone Tribe
- Elko Band Council
- Ely Shoshone Tribe
- Shoshone Paiute Tribes of the Duck Valley Indian Reservation
- South Fork Band Council
- Te-Moak Tribe of Western Shoshone

- Wells Band Council
- Western Shoshone Committee
- Western Shoshone Defense Project
- Western Shoshone Descendants of Big Smoky
- Yomba Shoshone Tribe

### 3.4.3.2 Environmental Consequences

#### 3.4.3.2.1 Proposed Action Alternative

Based on the description and location of the Proposed Action, the BLM has determined that the Proposed Action would not adversely affect any Native American religious site or religious practice or ceremony. The Project Area is not within a known Traditional Cultural Property. Existing ethnographic information does not suggest that Native American traditional, spiritual and/or cultural sites would be affected. Should issues arise, consultation will be on-going during the life of the Project. The government to government consultation process is an ongoing process and the BLM will continue to provide information to the tribes.

The BLM met with the Confederate Tribes of the Goshute Indian Reservation on October 5, 2012 and March 7, 2014 to discuss the Project. BLM will continue consultation with tribes as requested.

**Mitigation Measures**

The BLM has identified the following mitigation to reduce potential impacts to Native American Traditional Values:

- If any cultural properties, items, or artifacts (stone tools, projectile points, etc.) not previously recorded by the BLM are encountered, the items should NOT be collected and the BLM Wells Field Office must be notified immediately of the discovery (775-753-0200).
- Though the possibility of disturbing Native American gravesites within the Project Area is extremely low, inadvertent discovery procedures should be noted. Under the Native American Graves Protection and Repatriation Act, section (3)(d)(1), it states that the discovering individual must notify the land manager in writing of such a discovery. If the discovery occurs in connection with an authorized use, the activity, which caused the discovery, is to cease and the materials are to be protected until the land manager can respond to the situation.

#### 3.4.3.2.2 No Action Alternative

Under the No Action Alternative, there would be no effects from the either the Proposed Action Alternative or the Visual Alternative to Native American Traditional Values in the Project Area.

#### 3.4.3.2.3 Visual Alternative

Effects under the Visual Alternative to Native American Traditional Values would be similar to those described above for the Proposed Action. Effects may be less because six well pads and associated access roads would not be built under this alternative.

### 3.4.3.3 Cumulative Effects

It is likely that Native American concerns would be affected by most of the anticipated present and future actions within the CESA in that continued or increased human presence almost always results in increased illegal collection and vandalism as well as conflicts with traditional uses and values. These effects would continue under the No Action Alternative. Neither the

Proposed Action Alternative nor the Visual Alternative would affect Native American concerns, and, therefore, would not result in cumulative effects.

### 3.4.4 PALEONTOLOGICAL RESOURCES

#### 3.4.4.1 Current Conditions

Paleontological resources are the fossilized remains of invertebrate and vertebrate animals and plants, including casts and molds. This resource constitutes a fragile and nonrenewable scientific record of the history of life on earth. Once damaged, or improperly collected or recorded, their scientific value is greatly reduced or lost forever.

The BLM has adopted the Potential Fossil Yield Classification (PFYC) system to identify and classify fossil resources on federal lands (BLM, 2007b). Paleontological resources depict a moment in geologic time that is definitively associated to the geologic strata that contain them (see Section 3.2.2). One might expect to find certain fossils of a specific age within appropriate strata of the same age; conversely, some designated fossils of abundant and wide-spread distribution serve as marker fossils to provide age correlation between strata. The PFYC system is a means by which to classify geologic units based upon the relative abundance of vertebrate fossils or scientifically significant (plant and invertebrate) fossils and their sensitivity to adverse impacts. A higher class number indicates higher potential for presence. The PFYC system is not intended to be applied to specific paleontological localities nor do a few widely scattered important fossils or localities necessarily indicate a higher class rating. The PFYC rating classification is intended to provide baseline guidance for predicting, assessing and mitigating paleontological resources. The classification must be considered at an intermediate point in the analysis and should be used to assist in determining the need for further mitigation assessment. The PFYC system is presented Table 3.4-4.

**Table 3.4-4**
**PFYC Descriptions**

| PFYC Class | Category | Description |
|---|---|---|
| 1 | Very low | Geologic units are not likely to contain recognizable fossil remains. |
| 2 | Low | Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils (plant and invertebrate). |
| 3 | Moderate or unknown | Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential. |
| 4 | High | Geologic units containing a high occurrence of significant fossils. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability. Surface disturbing activities may adversely affect these resources. |
| 5 | Very High | Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils of scientifically significant invertebrate or plant fossils, and that are at risk of human-caused adverse impacts or natural degradation. |

In the Elko District, paleontological resources occur in sediments and tuffaceous sediments throughout the Tertiary. Fossilized fish are known to occur with plant fossils in the Oligocene Elko Formation in silty shales. As such, these fossils would rate a “3” in the PFYC system because, although recognized to exist, there is very little scientific data addressing their extent.

Fossils of vertebrates, including varieties of extinct camelids, antelope and ancestral horses, have been found in tuffaceous siltstones, sandstones and limestone within the Carlin, Humboldt and similar Miocene-aged strata throughout the district. Again, because the presence of these

fossils is coupled with a lack of scientific data, Miocene strata would also rate a “3” in the PFYC system.

Remnants identified as mastodon remains have been found in Pliocene sands in Spring Creek, Nevada. If dated correctly, these fossils represent one of only a dozen or so American Mastodons that date to this time period. It is the first well-documented occurrence in Nevada and in the Great Basin. Because so little scientific data exist with respect to the recognized occurrence, Pliocene strata is also designated a “3” rating in the PFYC system.

#### 3.4.4.2 Environmental Consequences

##### 3.4.4.2.1 Proposed Action Alternative

It is not anticipated that surface disturbing activities would unearth Quaternary fossils.

**Mitigation Measures**

The BLM has identified the following measure to mitigate effects to paleontological resources:

- Should paleontological resources be discovered during any phase of the Proposed Action, Noble should cease operations and notify the BLM AO.

##### 3.4.4.2.2 No Action Alternative

Under the No Action Alternative, neither the Proposed Action Alternative nor the Visual Alternative would occur and therefore, no direct or indirect impacts to paleontological resources would result.

##### 3.4.4.2.3 Visual Alternative

Effects to paleontological resources under the Visual Alternative would be the same as those presented under the Proposed Action; however, disturbance associated with well pads R-27M, R-27F, R-27I, R-21K, R-21A, and R-10N and associated access roads would not occur.

#### 3.4.4.3 Cumulative Effects

Cumulative effects to paleontological resources within the CESA are not anticipated because, as described above, neither the Proposed Action Alternative nor the Visual Alternative are expected to affect paleontological resources.

### 3.4.5 VISUAL RESOURCES MANAGEMENT

#### 3.4.5.1 Current Conditions

Visual resources are the visible physical features of a landscape that convey scenic value. Scenic values have been classified by the BLM according to the Visual Resource Management (VRM) system. The objectives are to minimize the visual impacts of surface disturbing activities and to maintain scenic values on public lands.

The BLM-administered lands within the Project Area are designated as VRM Class IV. Class IV areas provide for management activities which require major modification of the existing character of the landscape. Activities may attract attention, may dominate the view, but are still mitigated.

The scenic setting on lands within and surrounding the Project Area consists of mostly flat, brush-covered terrain interspersed with shallow draws and stream drainages. The Humboldt River and Bishop Creek are the major waterways in the area, coursing through the southeast portion of the Project Area boundary. These features result in landscape characteristics that include flat to rolling forms, horizontal and undulating lines, tan to light green colors, and smooth textures.

### 3.4.5.2 Environmental Consequences

#### 3.4.5.2.1 Proposed Action Alternative

Visual resources would be impacted by surface disturbing activities, fugitive dust, and the presence of wells throughout the Project Area. These activities would create impacts to visual resources on a localized scale including contrasts in line, form, color and texture, depending upon site-specific landscape characteristics. During the 24-hour per day drilling phase of the Proposed Action, rig lighting would also be evident at night.

Surface disturbance would be the major cause of visual resource impacts. Impacts under the Proposed Action would include well pad and road construction and road improvements. These features would present marked breaks and changes in the texture of the vegetation and landform patterns present. Well pad surface disturbance would impact visual line and texture elements in much the same way. Cut and fill effects from roads and well pads would also introduce distinct color and texture contrasts by exposing bare soils in areas where native vegetation and top soil comprise the existing landscape color elements.

Noble would paint all facilities or structures with earth-tone colors such as “desert tan” to reduce the visual impact. All areas slated for short-term disturbance would be re-contoured and revegetated to blend with the natural topography as soon as possible after construction, where practicable. Outdoor lighting on facilities and/or drilling rigs would not exceed the amount necessary to provide for worker safety and would be down-directed in order to eliminate glare and minimize upward light scattering. Lighting of facilities would follow ”dark sky” lighting practices (IDA, 2014).

The Proposed Action would take place in a designated VRM Class IV area on BLM-administered lands and would not conflict with the management objectives associated with this classification.

**Mitigation Measures**

The BLM has not identified mitigation measures to further reduce visual impacts.

#### 3.4.5.2.2 No Action Alternative

Under the No Action Alternative, there would be no impacts from either the Proposed Action Alternative or the Visual Alternative to visual resources in the Project Area.

#### 3.4.5.2.3 Visual Alternative

Effects to visual resources under the Visual Alternative would be similar to those described above for the Proposed Action Alternative. Visual effects to the CNHT and the CSPRR are discussed in Sections 3.4.1 and 3.4.2.

### 3.4.5.3 Cumulative Effects

Under the No Action Alternative, existing visual impacts would continue. As described above, visual impacts would occur under the Proposed Action Alternative and the Visual Alternative. With implementation of design features and mitigation measures, cumulative impacts to visual resources are expected to be minimal.

## 3.4.6 SOCIOECONOMICS

### 3.4.6.1 Current Conditions

The Project Area is located in central Elko County. Historically, the county’s economy has been based on hard rock mining; intermodal transportation; gaming; cattle ranching; and federal, state, and local governments. With a 2010 population of 18,297, the City of Elko is the largest

city and the regional trade center for northeastern Nevada. The Project Area is in high desert terrain at the base of the East Humboldt Range, approximately 36 miles northeast of Elko, and 4 miles northwest of the City of Wells, an historic railroad and ranching community located at the intersection of Interstate-80 and US 93.

## Population

Elko County is sparsely populated, with 2.8 persons per square mile, compared to a statewide average of 26.9 persons per square mile. The county's population increased rapidly between 1980 and 2000; nearly doubling from 17,269 in 1980 to 33,530 in 1990, and increasing another 35 percent to 45,291 in 2000. Population growth tapered over the next decade, increasing only 8 percent to 48,818 in 2010. The U.S. Census Bureau estimated that the county had 49,491 residents in 2011 (U.S. Census Bureau, 2012). The Nevada State Demographer's Office (NSDO) projects that Elko County's population will grow by nearly 37 percent over the coming decade, increasing to 65,207 in 2020 (NSDO, 2012).

Wells experienced modest to negative population growth over the past three decades. The town's population grew from 1,218 in 1980 to 1,256 in 1990 and 1,385 in 2000. In 2010, the town's population had fallen to 1,292 (NSDO, 2012). The U.S. Census Bureau estimated that Wells' population increased to 1,357 in 2011 (U.S. Census Bureau, 2012).

## Income and Employment

**Income.** Personal income measures the income that individuals receive through earnings, asset ownership and transfer receipts (*i.e.* income received for services not currently rendered). Earnings, which include proprietor, self-employment and wage income, typically comprise a large portion of personal income, and are an especially large source of personal income in Elko County. In 2011, earnings contributed 64 percent to personal income in Nevada and 78 percent in Elko County. Investment income (*i.e.* dividends, interest, and rent) accounted for 19 percent of personal income in Nevada and 11 percent in Elko County. Transfer receipts, which include retirement and pension benefits, disability and unemployment insurance, medical payments, and veterans' benefits accounted for 16 percent of per-capita personal income in Nevada and 11 percent in Elko County (Bureau of Economic Analysis – BEA, 2013).

Between 2000 and 2011, per capita personal income grew more rapidly in Elko County than in Nevada as a whole. During this time, per-capita personal income increased from $30,977 to $36,964 (a 19 percent increase) in Nevada, and from $25,419 to $40,150 (a 58 percent increase) in Elko County (BEA, 2013).

**Employment.** Between 2002 and 2011, wage and salary employment in Elko County increased nearly 21 percent, from 18,410 to 22,320. Reflecting national economic conditions, most of the job growth occurred before 2008; job growth averaged 513 jobs per year between 2002 and 2008, and 117 jobs per year between 2008 and 2011. Over 80 percent of the jobs created between 2002 and 2011 were in the Mining (1,410 new jobs), Construction (1,040 new jobs) and Trade/Transportation/Utilities (750 new jobs) sectors. During these years, employment gains were partially offset by job losses in the Leisure and Hospitality (360 lost jobs), Financial Activities (80 lost jobs) and Information (70 lost jobs) sectors (Nevada Department of Employment, Training, and Rehabilitation – NDETR, 2012).

In 2011, major sources of employment in Elko County included the Leisure and Hospitality, Trade/Transportation/Utilities, Mining, and Government sectors. The county's largest employers were the Elko County School District, which covers the entire county; Cactus Pete's Hotel and

Casino in Jackpot; and the Peppermill Hotel Casino and Wendover Casino, in Wendover (Northeastern Nevada Regional Development Authority, 2012).

Annual wages in Elko County averaged $46,119 in 2011, and were highest in the Mining and Construction sectors, at $82,140 and $68,840, respectively; and lowest in the Leisure and Hospitality sector, at $23,018 (NDETR, 2012).

**Unemployment Rates.** Since 2000, annual unemployment rates in Elko County have been comparable to or lower than the national unemployment rate, and lower than the Nevada unemployment rate. Between 2000 and 2011, the average annual unemployment rate in the United States ranged from a low of 4.0 percent in 2000 to a high of 9.7 percent in 2010. During this time, the annual unemployment rate in Nevada ranged from lows of 4.2 percent in 2000 and 2006 to a high of 13.7 percent in 2010. In Elko County, the annual unemployment rate ranged from a low of 3.4 percent in 2007 to a high of 7.4 percent in 2010. Unemployment rates lowered slightly in all jurisdictions during 2011 and 2012. Between January and October of 2012, unemployment rates averaged 8.2 percent in the United States, 11.9 percent in Nevada, and 6.3 percent in Elko County (Bureau of Labor Statistics - BLS, 2013a).

Table 3.4-5 summarizes population, income, employment, and unemployment trends in affected jurisdictions between 2000 and 2011.

**Table 3.4-5**
**Population, Income, Employment and Unemployment Trends in Affected Jurisdictions**

| | 2000 | 2010 | 2011 |
|---|---|---|---|
| **Population** | | | |
| Nevada | 1,998,257[1] | 2,700,551[2] | 2,723,322[3] |
| Elko County | 45,291[1] | 48,818[2] | 49,491[3] |
| City of Wells | 1,385[1] | 1,292[2] | 1,357[3] |
| City of Elko | 16,708[1] | 18,297[2] | 19,209[3] |
| **Per Capita Personal Income**[4] | | | |
| Nevada | $30,977 | $36,692 | $36,964 |
| Elko County | $25,419 | $38,422 | $40.450 |
| **Wage and Salary Employment**[5] | | | |
| Nevada | 1,017,817 | 1,108,030 | 1,114,639 |
| Elko County | 19,920 | 20,910 | 22,320 |
| **Unemployment Rate**[6] | | | |
| Nevada | 4.2% | 13.7% | 13.6% |
| Elko County | 3.9% | 7.4% | 7.1% |

Sources:
[1] U.S. Census Bureau, 2001.
[2] U.S. Census Bureau, 2011.
[3] U.S. Census Bureau, 2012.
[4] BEA, 2013.
[5] NDETR, 2012.
[6] BLS, 2013a.

## Fiscal Conditions

Nevada county governments obtain revenues from a combination of locally derived and state shared sources. Local sources include property taxes on real and personal property and on the net proceeds of minerals located in the county. Counties also collect revenues from fines, licenses and permits, and fees for services. State-shared revenues include sales, motor vehicle, fuel, and gaming revenues.

Intergovernmental resources, primarily from state revenue sharing, are the largest source of revenue to Elko County. Between 2010 and 2012, intergovernmental resources accounted for an average of 55 percent of annual county revenues. Property taxes are the county's second largest revenue source; between 2010 and 2012 property taxes accounted for an average of 28 percent of annual county revenues. Charges for services, fines and forfeitures, licenses and permits, and miscellaneous sources provide the remainder of the county's revenues. Total revenues to Elko County government increased from $41.5 million in 2010 to $42.1 million in 2011 and were budgeted to fall to $40.6 million in 2012 (Elko County, 2011; Elko County, 2012).

Oil and natural gas production affects a county's fiscal status largely through its impact on the ad valorem, or property, tax base. Unlike property that is subject to property tax in Nevada, and assessed at 35 percent of its taxable value, oil and gas production is assessed at 100 percent of taxable value and subject to the net proceeds of minerals tax, which ranges from 2 to 5 percent, depending on the ratio of net proceeds to gross proceeds. Because the net proceeds of minerals tax is an ad valorem tax in lieu of a production-related property tax, the amount of the net proceeds multiplied by the property tax rate goes to the county where the mineral was extracted. Any additional amount of tax paid up to the 5 percent statutory cap goes to the state (Nevada Taxpayers Association, 2008).

Net proceeds of minerals comprise approximately 20 percent of Elko County's total assessed value, with assessed valuations for real and personal properties accounting for the remainder. The total assessed valuation in Elko County increased from $1.4 billion in 2010 to $1.6 billion in 2012 (an 11 percent increase). During this time, net proceeds of minerals increased 26 percent, from $236.4 million to $296.6 million, and assessed property values increased 9 percent, from $1.2 billion to $1.3 billion (Nevada Department of Taxation – NDT, 2010, 2011, and 2012).

## Housing

Most of the housing in Elko County and Wells consists of owner-occupied single-family and mobile homes. According to the Census Bureau, 539 of the 668 housing units in Wells are occupied. Owners occupy 77 percent of Wells' occupied housing units and renters occupy 33 percent. Between 2007 and 2011, the median home value in Wells was $156,700, vacancy rates at rental properties in Wells averaged 21.8 percent, and monthly rents averaged $632. The City of Elko would provide additional housing opportunities to Project Area workers. Elko has approximately 7,075 housing units, 6,644 of which are occupied. Owners occupy 65 percent of Elko's occupied housing units and renters occupy 35 percent. Between 2007 and 2011, the median home value in Elko was $196,300, rental vacancy rates in Elko averaged 4.2 percent, and monthly rents averaged $871 (U.S. Census Bureau, 2011).

Short-term housing accommodations near the Project Area include eight motels, with approximately 300 rooms, in Wells; and 26 motels, with approximately 2,030 rooms, in Elko (TripAdvisor, 2013; Wells Chamber of Commerce, 2013). Six recreational vehicle (RV) parks, with approximately 220 sites, with and without-hookups, are located in the Wells vicinity, and five RV parks, with approximately 480 sites, are located in Elko (Wells Chamber of Commerce, 2013; RV Park Reviews, 2013). Because these estimates are based on lodging facilities with an on-line presence, they are likely to underestimate the number of short-term housing accommodations in the vicinity of the Project Area as they do not include smaller establishments and privately-let facilities that do not advertise on the internet.

According to motel managers in Wells, occupancy rates tend to be lowest during the winter (often near 30 percent) and higher during the spring and summer (typically 60 to 70 percent). Motel occupancies are highest during summer events, which include the Wells Fun Run Car

Show and Cruise in July and the Bonneville Salt Flats Speed Week in August (Garcia, 2013; Kelley, 2013; Kesla, 2013),

**Public Safety**

**Medical Services.** In late 2011, Wells Family Medicine replaced the Wells Rural Medical Clinic to provide medical services in Wells. As part of the Northeastern Nevada Regional Hospital system, Wells Family Medicine has three full-time employees, including one nurse practitioner, and full access to physicians and medical support services at the Northeastern Nevada Regional Hospital in Elko. Wells Family Medicine is open Monday through Friday, and provides routine care for acute and chronic conditions, diagnosing, prescribing, and women's and child care services.

Physicians and other medical practitioners in Elko provide additional routine medical and emergency services to residents and workers in the Project Area. The Northeast Nevada Regional Hospital is the principal health care facility in northeastern Nevada, providing 24-hour emergency care and 75 acute care rooms. The hospital has a full service lab, an intensive care unit, magnetic resonance imaging and computerized aerial tomography scan capabilities, and provides most major medical specialty services.

**Emergency and Fire Protection Services.** The Wells Volunteer Fire Department (VFD) provides first response fire and emergency services in the Project Area and within the City of Wells. The Wells VFD has one paid and approximately 12 volunteer firefighters, many of whom have Emergency Medical Technician training (Smith, 2013). State and federal agencies, including the BLM and Nevada Division of Forestry, have wildland firefighting units that provide additional fire protection services in outlying areas of Elko County, and participate in mutual aid/cooperative agreements with local fire departments. The BLM has a fire station in Wells that has three fire trucks and is open seasonally. The station is staffed between June and September with ten seasonal firefighters and a full-time Fire Operations Supervisor who is based in the BLM Elko District Office during the winter. The BLM also has a seasonally-staffed fire station in Elko that has three fire trucks, a bulldozer, a helicopter, and a heliattack platform. Seasonal staffing in the Elko BLM fire station includes 13 firefighters and a seven-man helicopter crew (Murphy, 2014). Additional BLM wildland firefighting resources include Interagency Hotshot Crews who assist BLM district and field offices with fire suppression. The Elko District Office coordinates the BLM's Interagency Hotshot Crews in northeastern Nevada.

Elko County Ambulance Service has an ambulance unit stationed in Wells. The ambulance service, which includes paramedics, Emergency Medical Technicians, and volunteers, is staffed by Elko County. All ambulance service is dispatched through central dispatch in Elko.

**Law Enforcement.** The Elko County Sheriff's Office, Wells Substation provides first-call police services in the Project Area and within the City of Wells. Five deputies are assigned to the Wells Substation (Morton, 2013). One BLM Law Enforcement Officer is stationed in Elko. The Nevada Highway Patrol provides law enforcement services on state highways and Interstate-80 in the Project Area vicinity.

### 3.4.6.2 Environmental Consequences

#### 3.4.6.2.1 Proposed Action Alternative

Most socioeconomic impacts, including those related to population, employment, government revenues, housing, and public safety and emergency services, would be dependent on the size of the workforce and the length of time construction (including drilling) and operations

(production of the well) would continue. Potential workforce requirements and socioeconomic impacts (especially those related to employment, income, and housing) would be greatest during the Construction/Drilling Phase. Fiscal impacts would be greatest during the Production/Operations Phase. During operations, the Proposed Action would have lower impacts on employment and income, and on-going fiscal impacts.

**Population**

Noble expects that non-local workers would comprise approximately 90 percent of the workforce during the Construction/Drilling Phase and between 55 and 75 percent of the workforce during the Production/Operations Phase. The workforce required for exploratory drilling is largely transitory because drilling and completion crews tend to temporarily relocate to areas where fields are being explored, and are not typically accompanied by dependents. Based on anticipated production levels, the operational workforce would include approximately 19 oil truck drivers employed by crude oil transportation companies located outside of Elko County. These workers are expected to live outside Elko County and would not be likely to relocate due to the Proposed Action. Residents of Elko County are expected to comprise 45 percent of the operational workforce (see Table 2.2-10). Approximately 13 water truck drivers would be required during operations if produced water is hauled away for off-site disposal, and as few as three water truck drivers would be required if produced water is disposed in an on-site injection well. Produced water truck drivers and three additional production workers (one pumper, one maintenance worker, and one truck driver for dust control) are expected to be drawn from the existing population in the Wells vicinity. Few workers are expected to relocate to the Wells area due to operational activities associated with the Proposed Action. Therefore, neither the Construction/Drilling Phase nor Production/Operations Phase workforces would be expected to impact regional or local population trends.

**Income and Employment**

Direct employment benefits of the Proposed Action would include up to 130 temporary construction jobs and up to 35 jobs associated with year round production. In 2011, wages earned in Nevada in industries supporting the drilling of oil and gas wells averaged $1,323 per week ($68,778 per year) and wages earned by freight truck drivers averaged $880 per week, or $45,755 per year (BLS, 2013b).

The Proposed Action would also generate indirect economic benefits to local and regional businesses through purchase of goods and services required for the Project. The demand for goods and services would be further stimulated by the Proposed Action's workforce and by employees of businesses that support the Proposed Action and its workforce. Most of these regional benefits would be likely to occur in Elko, where several regional business services are located.

**Fiscal Conditions**

Oil production in the Project Area would provide economic benefits to federal, state and local governments through the generation of federal mineral lease (FML) royalties, net proceeds of mineral tax, and property tax on physical assets. Noble estimates average well production of approximately 231,000 barrels (9.7 million gallons) of oil over a well's anticipated productive life of approximately 20 years. Oil production rates are typically highest when a well is drilled and decline rapidly thereafter. This analysis of fiscal impacts assumes that average well production decreases from approximately 42,200 barrels (1.77 million gallons) in Year 1 to approximately 8,700 barrels (365,400 gallons) in Year 10 and approximately 5,200 barrels (218,400 gallons) in Year 20. These estimates are annual averages and do not imply that any single well would produce at this level in any given year. Based on 2012 monthly prices of domestic crude oil

reported by the Energy Information Administration (EIA), the tax estimates below assume a price of $85.62 per barrel of oil (EIA, 2012).

## FML Royalties

Twenty of the 35 potential well pads in the Project Area are located on federal mineral leases and subject to an FML royalty rate of 12.5 percent on the net revenues from extracted oil. Under the assumptions noted above, average FML royalties from a single well would range from $451,666 in Year 1 to $93,549 in Year 10 and $55,523 in Year 20 (see Table 3.4-6). Fifty-one percent of these revenues would be retained by the federal government and 49 percent would be returned to the State of Nevada and distributed to stage agencies and programs, higher education, and communities impacted by mineral development.

**Table 3.4-6**
**Estimated Average Per Well FML Royalty and**
**Net Proceeds of Mineral Tax Revenues, Years 1, 10 and 20**

| Government Revenues | Year 1 | Year 10 | Year 20 |
|---|---|---|---|
| **Wells on Federal Minerals** | | | |
| FML Royalties | $451,666 | $93,549 | $55,523 |
| FML Royalties Returned to Nevada | $221,316 | $45,839 | $27,206 |
| Net Proceeds of Minerals Tax | $110,658 | $22,920 | $13,603 |
| Elko County Portion of Net Proceeds of Minerals Tax | $81,011 | $16,779 | $9,959 |
| State Portion of Net Proceeds of Minerals Tax | $29,647 | $6,140 | $3,644 |
| **Wells on Private Minerals** | | | |
| Net Proceeds of Minerals Tax | $126,467 | $26,194 | $15,546 |
| Elko County Portion of Net Proceeds of Minerals Tax | $92,584 | $19,176 | $11,381 |
| State Portion of Net Proceeds of Minerals Tax | $33,882 | $7,018 | $4,165 |

## Net Proceeds of Minerals

All wells would be subject to net proceeds of minerals tax. Royalties and other deductions are subtracted from a well's gross proceeds to calculate the net proceeds on which this tax is based. Assuming an average tax rate of 3.5 percent on net proceeds, average anticipated production from a well on federal minerals would generate net proceeds of minerals tax revenues from $110,658 in Year 1 to $22,920 in Year 10 and $13,603 in Year 20. An average well on private minerals would generate revenues between $126,467 in Year 1, $26,194 in Year 10, and $15,546 in Year 20.

Elko County would receive a portion of these revenues equal to the assessed value of production times the property tax rate. Based on the county's 2012 property tax rate of 2.562 percent, Elko County would receive between $81,011 in Year 1, $16,779 in Year 10, and $9,959 in Year 20 from an average well on federal minerals. The county would receive between $92,584 in Year 1, $19,176 in Year 10, and $11,381 in Year 20 from net proceeds of minerals tax revenues from a single well on private minerals. The county's portion of net proceeds of mineral tax revenues would be used to fund the Elko County government, Elko County School District, Elko Convention Visitors Authority, Elko Television Station, State Natural Resource Conservation, and statewide capital improvements (NDT, 2012).

## Sales and Use Tax Revenue

The Proposed Action would generate sales and use tax revenue to Elko County through the sale of taxable goods either purchased in the county or purchased elsewhere and imported into the county. Most sales and use tax revenue would result from retail expenditures by Noble's direct employees, its contractors, and individuals whose jobs would be supported by the

Proposed Action. Sales and use tax receipts would be highest during the Construction/Drilling Phase.

## Housing

The Proposed Action is not expected to have a noticeable impact on Elko County or Wells' long-term housing markets because the influx of new permanent workers into the region is likely to be minimal and within the county's absorptive capacity. Local residential real estate markets would respond to a potential increase in the demand for housing due to the Project's permanent workforce either through the construction of new housing units or the sale of existing housing units.

The construction workforce would be likely to impact Wells' short-term housing market through increased motel occupancy rates, but it would not be likely to have a large impact on short-term housing markets across the county. Because drilling workers would remain on-site in temporary housing accommodations while the well is being drilled, the demand for short-term housing would peak with approximately 50 non-local construction workers. This potential peak demand corresponds to approximately 17 percent of the motel rooms in Wells, approximately 10 percent of the motel rooms and RV sites in Wells, and approximately 2 percent of the motel rooms and RV sites in Wells and Elko. There could be upward pressure on motel rates in Wells during the Construction/Drilling Phase, especially if the peak construction workforce were to coincide with special events such as the Wells Fun Run Car Show or the Bonneville Salt Flats Speed Week. At such times, some Project workers, recreationists and/or tourists could be in the position of travelling to Elko (36 miles) or Wendover (60 miles) in order to secure suitable lodging accommodations.

## Public Safety

**Medical Services.** Temporary workers who travel to job sites typically rely on medical service providers at home for routine medical services. However, there could be a temporary increase in the demand for local medical services at Wells Family Medicine. Because construction workers would be in the Project Area for relatively short periods of time, and few operations workers are expected to relocate to Elko County, the Proposed Action is not expected to have a substantial impact on medical service providers in the region.

**Emergency and Fire Protection Services.** Construction activities in the Project Area could result in medical emergencies that would place additional demands on the Wells VFD and Elko County Ambulance Service. Implementation of Noble's Fire Prevention Plan Measures related to fire prevention as described in Appendix J would reduce the potential demands placed on the Wells VFD and supplementary firefighting and emergency response personnel in Elko County.

**Law Enforcement.** During construction, the Proposed Action could increase drug-related and other offenses frequently associated with transient workforces. Enforcing the requirement that drilling workers housed on-site remain within the Project Area during the period in which a well is drilled would reduce the risks of such offenses and decrease potential demands on local law enforcement agencies.

## Mitigation Measures

The BLM has not identified mitigation measures to further reduce potential socioeconomic impacts.

#### 3.4.6.2.2 No Action Alternative

Under the No Action Alternative, neither the Proposed Action Alternative nor the Visual Alternative would be developed and there would be no short-term employment gains associated with construction, and no long-term employment and fiscal gains associated with field production.

#### 3.4.6.2.3 Visual Alternative

Effects to socioeconomic resources under the Visual Alternative would be the same as those described above for the Proposed Action Alternative.

### 3.4.6.3 Cumulative Effects

Cumulative effects to socioeconomic resources in the CESA include mining, oil and gas exploration, geothermal resource, and other industrial development, and ongoing agricultural and tourism activities. These effects would continue under the No Action Alternative. As described above, either the Proposed Action Alternative or the Visual Alternative would provide an additional source of government revenues to the State of Nevada and Elko County, and could have minor effects on short-term housing in Wells. To the extent that construction overlapped with the construction or development of other projects in the region, upward pressure on motel rates and occupancies could intensify. No cumulative effects of concern for socioeconomic resources have been identified.

## 3.4.7 ENVIRONMENTAL JUSTICE

### 3.4.7.1 Current Conditions

Executive Order 12898 requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations (defined as those living below the poverty level). Between 2007 and 2011, minorities, including persons of African American, American Indian, Asian, Pacific Islander, and Hispanic descent, comprised 62 percent of the population in Nevada, 43 percent of the population in Elko County, and 42 percent of the population in Wells. During this period, low-income populations comprised 12.9 percent of Nevada's population, 8.6 percent of Elko County's population, and 7.6 percent of Wells' population (U.S. Census Bureau, 2012).

In the Town of Wells, the colony of the Wells Band of the Te-Moak Tribe of Western Shoshone Indians is one of the closest properties to the Project site. Thirty-four members of the Te-Moak Tribe live in the Wells Colony. The Project boundary is less than 4 miles from Wells, and the Band's property sits on the edge of town adjacent to the Project site. The Tribal colony is located on US 40, which is one of the main transportation routes in and out of town.

### 3.4.7.2 Environmental Consequences

#### 3.4.7.2.1 Proposed Action Alternative

Overall, Elko County contains lower portions of minority and low-income populations than the state of Nevada as a whole. The town of Wells contains slightly lower portions of minority and low-income populations as compared to Elko County. Therefore, the Proposed Action would not result in disproportionately high and adverse human health or environmental impacts on minority or low-income populations.

Although the majority of traffic-related Project impacts are expected to occur on County Roads 753 and 754, it is possible that the Te-Moak Tribe would experience disproportionate impacts due to increased traffic volumes. There is also a possibility that due to the Tribe's geographic

location in relation to the Project site, members of the Tribe could experience disproportionate impacts from other Project-related activities.

**Mitigation Measures**

The BLM has not identified any mitigation measures to further reduce potential impacts to environmental justice.

#### 3.4.7.2.2 No Action Alternative

Under the No Action Alternative, there would be no impacts on minority and low-income populations from the Proposed Action Alternative or the Visual Alternative.

#### 3.4.7.2.3 Visual Alternative

Effects to environmental justice under the Visual Alternative would be the same as those described above for the Proposed Action Alternative.

### 3.4.7.3 Cumulative Effects

As described above, neither the Proposed Action Alternative nor the Visual Alternative would have an adverse effect on minority or low-income populations and would therefore not contribute to an incremental increase in cumulative effects with the CESA.

## 3.4.8 TRANSPORTATION AND ACCESS

### 3.4.8.1 Current Conditions

Primary access to the Project Area is via Interstate-80, US 40, SR 230 (Starr Valley Road), County Road (CR) 753 (Deeth-O'Neil Road), CR 754 (Metropolis Road), and 6th, 7th, and 8th streets and Humboldt Avenue in Wells. Access to the Project Area is described above in Chapter 2 and detailed in the Transportation Plan (Appendix A).

Table 3.4-7 shows the Nevada Department of Transportation's (NDOT) average daily traffic (ADT) counts in 2009, 2010, and 2011 at Interstate-80 interchanges and on roads in the vicinity of the Project Area. In addition to NDOT's reported traffic volumes, the Elko County Road Department reported a 2011 ADT of 118 vehicles on CR 754, just northwest of Wells city limits. Traffic counts are not available for CR 753 (Tipton, 2013).

**Table 3.4-7**
**Average Daily Traffic at Interstate-80 Interchanges**
**and on Roads Near the Project Area, 2009, 2010, and 2011[1]**

| Interstate 80 Interchange | Station ID | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| **Deeth-Starr Valley Interchange (Exit 333)** | | | | |
| East-bound off-ramp | 0113 | 80 | 80 | 80 |
| West-bound off-ramp | 0116 | 50 | 50 | 50 |
| East-bound on-ramp | 0115 | 50 | 50 | 50 |
| West-bound on-ramp | 0117 | 80 | 80 | 80 |
| On SR 230, south of the Deeth Interchange | 0076 | 160 | 180 | 170 |
| On SR 230, 0.6 miles south of CR 753 | 0074 | 100 | 100 | 100 |
| **Welcome-Starr Valley Interchange (Exit 343)** | | | | |
| East-bound off-ramp | 0118 | 60 | 90 | 90 |
| West-bound off-ramp | 0122 | 60 | 60 | 60 |
| East-bound on-ramp | 0120 | 90 | 50 | 50 |
| West-bound on-ramp | 0125 | 40 | 90 | 90 |
| Frontage Road, 0.1 mile east of the Welcome interchange | 0123 | -- | 80 | 80 |
| Between Deeth and Welcome interchanges | 0350 | 6,800 | 6,700 | 6,600 |
| **Beverly Hills Interchange (Exit 348)** | | | | |

| Interstate 80 Interchange | Station ID | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| 0.2 miles west of the Beverly Hills interchange | 0284 | 6,700 | 6,600 | 6,700 |
| East-bound off-ramp | 0286 | 20 | 20 | 20 |
| West-bound off-ramp | 0288 | 20 | 20 | 20 |
| East-bound on-ramp | 0287 | 20 | 20 | 20 |
| West-bound on-ramp | 0285 | 20 | 20 | 20 |
| **West Wells Interchange (Exit 351)** | | | | |
| 0.3 miles west of the West Wells interchange | 0292 | 6,700 | 6,600 | 6,700 |
| East-bound off-ramp | 0294 | 430 | 400 | 460 |
| West-bound off-ramp | 0296 | 210 | 210 | 250 |
| East-bound on-ramp | 0295 | 370 | 370 | 400 |
| West-bound on-ramp | 0293 | 190 | 190 | 220 |
| On 6th Street, 0.1 mile east of West Wells interchange | 0297 | 1,100 | 1,400 | 1,000 |
| On Angel Lake Road, 25 feet south of West Wells interchange | 0299 | 1,000 | 1,200 | 790 |
| **Access Route in Wells** | | | | |
| On 6th Street, 100 feet west of Lake Avenue | 0128 | 1,600 | 1,900 | 1,400 |
| CR 754 (Metropolis Road) just outside Wells city limit[2] | -- | -- | -- | 118 |

Sources:
[1] NDOT, 2012.
[2] Tipton, 2013.

NDOT maintains Interstate-80 and SR 230, Elko County maintains CR 753 and CR 754, and the City of Wells maintains city streets. CR 753 is paved south of Interstate-80 and CR 754 is paved for 13 miles out of Wells. In Wells, 6th Street is paved, but 7th and 8th streets and Humboldt Avenue north of 6th Street are unpaved. Unpaved roads have gravel or unimproved dirt surfaces. Elko County plows CR 754 during the winter, but not CR 753 (Tipton, 2013). Maintenance of the access route is described in detail in the Transportation Plan (Appendix A).

### 3.4.8.2 Environmental Consequences

#### 3.4.8.2.1 Proposed Action Alternative

The Proposed Action could have direct impacts on transportation in the vicinity of the Project Area by increasing traffic volumes; and have indirect impacts through increasing opportunities for vehicle collisions with wildlife and other vehicles, and contributing to roadway deterioration and dust creation on unpaved roads. The majority of these impacts would occur in the second year, when construction traffic would be highest.

The Transportation Plan (Appendix A) describes elements of the Proposed Action that are designed to minimize potential impacts to transportation and access. To reduce truck traffic during construction, Noble intends to provide on-site housing for drill crews and other drilling personnel. Based on the traffic estimates described in Section 2.2.1 and the Transportation Plan, construction traffic would peak at 72 vehicle round-trips per day during the second year of the Construction/Drilling Phase. This traffic could occur if one vertical/directional well and one horizontal well were being drilled and one horizontal well was being completed simultaneously. Assuming production from 20 wells and off-site disposal of produced water, traffic during the Production/Operations Phase would peak at 35 vehicle round-trips per day. If produced water is disposed in an on-site injection well, traffic would peak at 22 vehicle round-trips per day.

Peak Project-related traffic could potentially occur on CR 753 (Deeth-O'Neil Road) and CR 754 (Metropolis Road), depending on where the 20 wells are located. Table 3.4-8 shows the estimated impacts of peak Project-related traffic with and without an on-site disposal/injection well. During the Construction/Drilling Phase, traffic levels could increase from 4 percent at Interstate-80 Exit 352 and 6 percent at Exit 348 to 94 percent at Exit 333, as compared to 2011

traffic levels. Potential traffic impacts during the Production/Operations Phase would depend, in part, on where produced water would be disposed. With off-site produced water disposal, peak production traffic could result in traffic increases ranging from 2 percent at Exit 352 and 3 percent at Exit 348 to 39 percent at Exit 333. With on-site produced water disposal, peak traffic could result in traffic increases ranging from 1 percent at Exit 352 and 2 percent at Exit 348 to 25 percent at Exit 333.

**Table 3.4-8**
**Estimated Traffic Increase at Interstate-80 Interchanges**
**Compared to 2011 ADT under the Proposed Action Alternative[1]**

| Interstate 80 Interchange | Construction | Operations | |
|---|---|---|---|
| | | Off-Site Produced Water Disposal | On-Site Injection Well |
| Deeth-Starr Valley Interchange (Exit 333)[2] | 94% | 39% | 25% |
| Beverly Hills Interchange (Exit 348) | 6% | 3% | 2% |
| US 93 East Wells Interchange (Exit 352) | 4% | 2% | 1% |

[1] Estimated impacts based on 2011 traffic volumes averaged across all on- and off-ramps at each interchange.

Project traffic would also increase traffic volumes on CR 754 (Metropolis Road). Peak construction traffic could result in traffic increases 17 to 71 percent higher than 2011 ADT on segments of CR 754 in and near Wells. If produced water is disposed off-site, peak operations traffic could result in traffic increases 7 to 29 percent above 2011 ADT on segments of CR 754 near Wells. If produced water is disposed in an on-site injection well, peak operations traffic could result in traffic increases 5 to 19 percent above 2011 ADT on segments of CR 754 near Wells. Traffic during the Construction/Drilling Phase would be temporary and would end following completion of the final well. During the Production/Operations Phase, traffic would peak in the early years of field production, and would decease with declining well production over time.

Highway routes may become subject to Nevada frost laws at any time to protect roadways during the spring thaw. Frost law reduces legal load weights due to critically sensitive roadbeds during cold and wet seasons. Haul routes may be impacted.

**Mitigation Measures**

The BLM has identified the following mitigation measure to further mitigate impacts to transportation and access under the Proposed Action:

- Executed written use agreements with any permittees should be provided to Nevada DOT prior to using existing permitted accesses.
- Maintenance and improvements of Nevada DOT routes should be coordinated through the District Engineer for District III, 1951 Idaho Street, Elko, Nevada.
- Noble should coordinate with the BLM and Nevada DOT to prepare a traffic study prior to hauling oil or produced water from more than four wells.

#### 3.4.8.2.2 No Action Alternative

Under the No Action Alternative, there would be no Project-related impacts to transportation from construction and operations of either the Proposed Action Alternative or the Visual Alternative.

#### 3.4.8.2.3 Visual Alternative

Under this alternative, new roads would not be built, road upgrades would be limited, and traffic would be curtailed in the southeast corner of the Project Area leading to well pads R-27M, R-

27F, R-27I, R-21K, R-21A, and R-10N (see Map 2.2-2 in Section 2.2.3). Elements of the Transportation Plan (Appendix A) designed to minimize potential impacts to transportation and access would also apply to the Visual Alternative.

Construction traffic would peak at 83 vehicle round-trips per day on CR 753 (Deeth-O'Neil Road) and 62 vehicle round-trips per day on CR 754 (Metropolis Road). Peak construction traffic on CR 753 would include the same number of vehicle round-trips as those described under the Proposed Action and peak construction traffic on CR 754 would include vehicles related to well completion, deliveries, and dust control. Peak production traffic on CR 753 would also include the same number of vehicles as those described under the Proposed Action (35 with off-site produced water disposal and 22 with an on-site injection well). Peak production traffic on CR 754 would include five vehicle round-trips with off-site produced water disposal and four vehicle round-trips with an on-site injection well.

Compared to 2011 traffic levels, peak construction/drilling traffic under the Visual Alternative could potentially increase traffic volumes by 3 percent at Exit 352, 5 percent at Exit 348, and 95 percent at Exit 333 (see Table 3.4-9). With off-site produced water disposal, peak production traffic could result in traffic increases ranging from less than 1 percent at exits 348 and 352 to 39 percent at Exit 333. With on-site produced water disposal, peak Project traffic could result in traffic increases ranging from less than 1 percent at exits 348 and 352 to 25 percent at Exit 333.

**Table 3.4-9**
**Estimated Traffic Increase at Interstate-80 Interchanges**
**Compared to 2011 ADT under the Visual Alternative[1]**

| Interstate 80 Exchange | Construction | Operations | |
|---|---|---|---|
| | | Off-Site Produced Water Disposal | On-Site Injection Well |
| Deeth-Starr Valley Interchange (Exit 333) | 95% | 39% | 25% |
| Beverly Hills Interchange (Exit 348)[2] | 5% | 0.4% | 0.3% |
| US 93 East Wells Interchange (Exit 352)[2] | 3% | 0.3% | 0.2% |

[1] Estimated impacts are based on 2011 traffic volumes averaged across all on- and off-ramps at each interchange.
[2] Under the Visual Alternative, CR 754 would access one potential well pad.

Under the Visual Alternative, peak construction traffic could result in traffic increases 10 to 42 percent higher than 2011 ADT on segments of CR 754 in and near Wells. The peak traffic increases would be temporary and would occur only during the Construction/Drilling Phase. With off-site produced water disposal, peak production traffic could result in traffic increases between 1 and 4 percent on CR 754 road segments near Wells. With on-site produced water disposal, peak operations traffic could result in traffic increases 1 to 3 percent above 2011 ADT on segments of CR 754 near Wells.

### 3.4.8.3 Cumulative Effects

Cumulative effects that could impact transportation resources include past, current and reasonably foreseeable future mineral, energy, and other industrial development in the CESA. These effects would continue under the No Action Alternative. As described above, both the Proposed Action Alternative and the Visual Alternative would have potential impacts to roadways in the CESA. With mitigation such as adherence to speed limits and dust control, and measures provided in the Transportation Plan, cumulative effects within the CESA would be minimized.

### 3.4.9 WASTES (HAZARDOUS OR SOLID)

#### 3.4.9.1 Current Conditions

Hazardous and solid wastes are not a part of the natural environment. They could be introduced into the environment as a result of implementation of the Proposed Action.

#### 3.4.9.2 Environmental Consequences

##### 3.4.9.2.1 Proposed Action Alternative

BLM IM WO-93-344 requires that all NEPA documents list and describe any hazardous and/or extremely hazardous materials that would be produced, used, stored, transported, or disposed as a result of a proposed Project.

A variety of wastes would be generated during drilling, well completion, and post-completion operations. Hazardous materials would also be used on site. These wastes and hazardous materials are described below.

**Drill Cuttings.** During drilling operations, drill cuttings from the well bore (mainly shale, sand, and miscellaneous rock minerals) and drilling fluids (mud) would be generated. Drilling muds may contain small concentrations of a variety of contaminants, including mercury, cadmium, arsenic, and hydrocarbons, which could adversely affect soil and water resources if released into the environment. Drill cuttings from each well bore are exempt from regulation under Subtitle C of RCRA but are still subject to other portions of the Law. Prior to burial and/or incorporation, composite samples per 100 cubic yards of cuttings will be collected and analyzed for BTEX, TPH (GRO/DRO), EC, SAR, pH, PAHs and Metals (As, Ba, Cd, Cr (III), Cr (VI), Cu, Pb, Hg, Ni, Se, Ag, Zn). The results of the analysis will be compared to NDEP soil cleanup standards to determine whether the cuttings can be buried/reincorporated or if further remediation and/or off-site disposal is warranted. Sampling will include potentially acid generating materials. If concentrations exceed NDEP soil cleanup standards and/or background concentrations the cuttings will be transported to an approved waste disposal facility (Clean Harbors located between Wendover, Nevada and Salt Lake City, Utah).

**Water from Hydraulic Fracturing.** During well completion, the typical method used for stimulating the formation to enhance the production of oil and gas consists of hydraulic fracture treatment of the reservoir. Water used during hydraulic fracturing could adversely affect soil and water resources if released to the environment; however, excess water would be stored in temporary tanks (closed loop system) prior to reuse or disposal.

**Hazardous Materials.** A variety of materials typical of oil and gas development could be at the site during construction and operations including lubricants, diesel fuel, gasoline, solvents, and hydraulic fluids. Hazardous materials which may be found at the site may include drilling mud and cementing products that are primarily inhalation hazards and materials that may be necessary for well completion/stimulation such as flammable or combustible substances and acids/gels (corrosives). Hazardous materials stored on site could adversely affect soil and water resources if released to the environment; however, no hazardous substances or wastes would be stored on the location after completion of a well. All hazardous substances brought to the location would have a Material Safety Data Sheet (MSDS) and would be properly handled so as to not cause harm to the environment or people. Secondary containment with 110 percent capacity would be utilized to contain potential spills.

**Other Solid Wastes.** Other solid wastes associated with drilling and well completion would include human waste and trash. Portable, self-contained chemical toilets at worksites would be used for human waste disposal. Sewage and gray water from the temporary on-site crew quarters would be stored in three 4,000-gallon domestic wastewater holding tanks sited near the

modular buildings on the well pad. Portable toilet and domestic wastewater holding tanks would be pumped and the contents hauled away for disposal at an approved sewage disposal facility on a timely basis. All garbage and non-flammable waste material would be collected in a container capable of preventing wind dispersion and disposed of at an approved, off-site facility. Other solid waste could adversely affect soil and water resources if released to the environment.

**Produced Fluids.** Produced water and oil would be stored on-site in tanks until it would be removed by truck. Produced water is typically high in salinity and contains some petroleum hydrocarbons and BTEX (benzene, toluene, ethyl benzene, and xylene) constituents. The aboveground tanks would remain on site for the life of the well(s). Long-term, undetected leaks from tank batteries are a potential source of groundwater contamination. Corrosion of steel tanks over the long term is quite likely, but Noble would monitor them on a regular basis. The high salt content of the produced water could very likely contribute to this process. Potential releases of produced water could occur from tanking, piping, and transport trucks. This could be the result of an accident, or tank/piping failure; however, all tanks and processing equipment would be surrounded by secondary containment adequate to retain at least 110 percent of the volume of the largest vessel with sufficient freeboard/storage for precipitation in the event of a release.

Surface waters could be negatively impacted by spills of produced water or oil, or hazardous materials stored at the pad. In cases where petroleum hydrocarbon or BTEX concentrations in contaminated soil are above regulatory limits, soil would be removed and disposed of at an approved facility. There is also the potential for diesel fuel spills from ruptured fuel tanks. Diesel spills generally require removal of contaminated soils. All spills would be quickly cleaned up. Prompt response in the case of diesel or produced water spills would minimize negative impacts to surface/groundwater, plant and wildlife resources. With incorporation of design features and effective response (implementation of a Spill Prevention Plan), direct, indirect impacts from wastes would be expected to be minimal.

**Mitigation Measures**

The BLM has identified the following mitigation measure to further reduce potential impacts from wastes:

- A spill prevention plan should be submitted to the BLM for approval prior to ground disturbance.

#### 3.4.9.2.2 No Action Alternative

Under the No Action Alternative, there would be no impacts associated with hazardous or solid wastes from the either the Proposed Action Alternative or the Visual Alternative.

#### 3.4.9.2.3 Visual Alternative

Effects associated with hazardous or solid wastes from the Visual Alternative would be similar to those described above for the Proposed Action.

### 3.4.9.3 Cumulative Effects

Through implementation of industry best management practices (i.e., proper disposal of drill cuttings, produced water, solid wastes, etc.) and a Spill Plan, cumulative effects in the CESA are not anticipated from either the Proposed Action Alternative or the Visual Alternative and would not exceed those impacts already occurring.

## 3.5.1 LIVESTOCK GRAZING

### 3.5.1.1 Current Conditions

Livestock grazing is the primary existing land use in the Project Area. BLM-administered lands in the area allotments are permitted to livestock grazing and there are intermingled private pastures. Twelve BLM grazing allotments coincide with the Project Area. Allotments include the Bishop Creek, Black Butte, Metropolis, Metropolis Seeding, Rabbit Creek, Westside, Mud Springs, Railroad Field, Antelope Springs FFR, Burnt Creek, Clover Creek FFR, and Hylton allotments, totaling 144,866 acres. A total of 15,241 active animal unit months (AUMs) are currently permitted for the allotments. Table 3.5-1 summarizes the size of the allotments, AUMs, period of use, and indicates the allotment acreage on BLM-administered land within the Project Area. Currently, the allotments are permitted to graze and/or trail cattle.

Groundwater wells and pipelines are the main source of water for livestock grazing on allotments in the Project Area. Springs, ephemeral streams, and stock ponds provide limited water sources, and permittees rely heavily on well water.

**Table 3.5-1**
**BLM Grazing Allotments Coinciding with the Project Area**

| Allotment | Total Allotment Acreage | Active AUMs | Period of Use[1] | Allotment Acreage in Project Area |
|---|---|---|---|---|
| Bishop Creek (3206) | 7,766 | 1,136 | 4/1 - 7/12 | 7,654 |
| Black Butte (3208) | 61,799 | 6,489 | 4/1 – 11/30 | 367 |
| Metropolis (3228) | 41,853 | 2,510 | 4/16 – 9/30 | 9,078 |
| Metropolis Seeding (3229) | 2,457 | 1,126 | 4/16 - 8/1 | 1,075 |
| Rabbit Creek (3233) | 6,715 | 1,072 | 4/15 – 9/30 | 4,490 |
| Westside (3241) | 7,874 | 1,725 | 3/15 – 7/15 | 8 |
| Mud Springs (3242) | 3,998 | 196 | 4/1 – 6/15 | 3,990 |
| Railroad Field (3243) | 3,165 | 113 | 5/1 – 9/2 | 3,165 |
| Antelope Springs FFR (3246) | 161 | 5 | 5/1 – 5/30 | 161 |
| Burnt Creek (3247) | 3,423 | 28 | 4/1 – 4/30 | 2,716 |
| Clover Creek FFR (4310) | 1,488 | 2 | 3/1 – 2/28 | 149 |
| Hylton (4319) | 4,167 | 839 | 4/10 – 7/21 | 974 |
| **Total** | **144,866** | **15,241** | **--** | **33,827** |

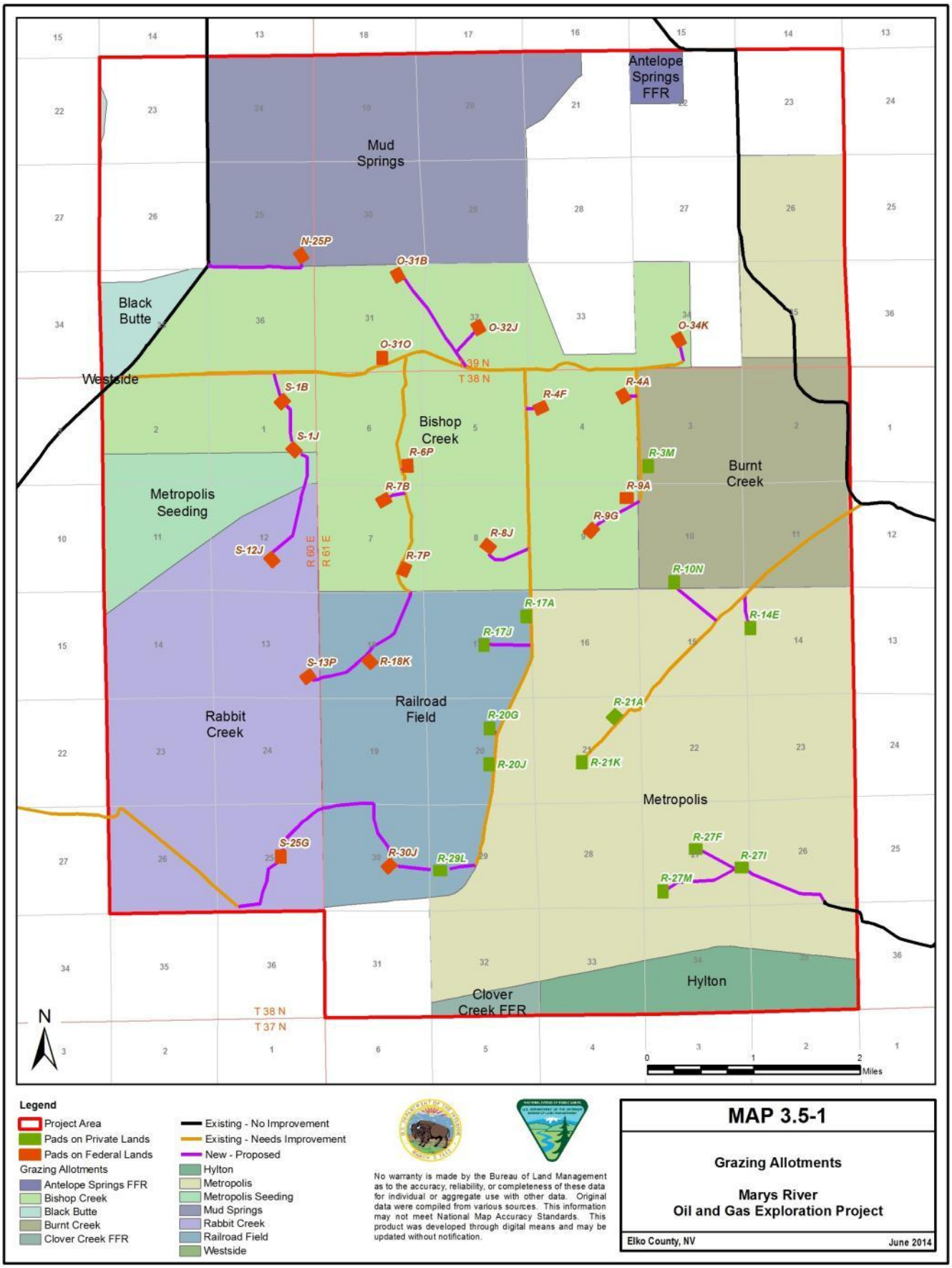
[1] Several of these allotments contain pastures through which livestock are rotated within this season of use.

### 3.5.1.2 Environmental Conditions

#### 3.5.1.2.1 Proposed Action Alternative

The Proposed Action would take place during a period when cattle are expected to be present on the grazing allotments. Increased vehicle traffic could raise the risk of injury or death to grazing cattle in the area, and potentially startle and scatter livestock. As noted in the Transportation Plan (Appendix A), Noble would reduce traffic by providing on-site accommodations for drilling workers and would limit driving speeds (20 mph).

A potential 381.8 acres of surface land is identified for construction of 33 well pads and associated roads of which about 248.3 acres are in grazing allotments on BLM-administered lands (see Map 3.5-1). No more than 20 of the 33 well pads would be constructed resulting in approximately 276.5 acres of surface disturbance but up to 248.3 acres identified within the grazing allotments could be disturbed.




**Legend**

- Project Area
- Pads on Private Lands
- Pads on Federal Lands

Grazing Allotments

- Antelope Springs FFR
- Bishop Creek
- Black Butte
- Burnt Creek
- Clover Creek FFR
- Existing - No Improvement
- Existing - Needs Improvement
- New - Proposed
- Hylton
- Metropolis
- Metropolis Seeding
- Mud Springs
- Rabbit Creek
- Railroad Field
- Westside

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

# MAP 3.5-1

**Grazing Allotments**

**Marys River**
**Oil and Gas Exploration Project**

Elko County, NV — June 2014

A potential loss of up to 25 AUMs could occur if all 20 well pads are constructed on BLM-administered lands. After interim reclamation, approximately 211.1 acres could remain disturbed throughout the Production/Operations Phase (based on 20 well pads constructed). The effects on forage grasses and other herbaceous vegetation in these areas are expected to last for at least two growing seasons after reclamation of areas of surface disturbance. This timeframe is based on normal climate conditions, proper seedbed preparation, animal activity, and prevention of other factors that may impair seedling establishment. These newly reclaimed and seeded areas could produce attractive forage for livestock, which could in turn prevent timely and effective reclamation if they are over-grazed. Displacement from affected areas or attraction to newly re-vegetated sites could change patterns in herbivory by livestock and their distribution.

Well pads would not be completely fenced off to cattle. Certain areas (equipment, structures, etc.) of well pads could be fenced to protect cattle and workers, determined on a case-by-case basis in consultation with permittees and the BLM Range Management Specialist. Based on potential disturbance could be 248.3 acres and approximately 33,827 allotment acres in the Project Area, 0.73 percent of the available AUMs in the Project Area could be affected and therefore, adjustments or reductions in permitted use on grazing allotments is not warranted. Noble would avoid streams, creeks, springs, and wetlands supporting wildlife and grazing stock by 400 feet and would minimize potential impacts to grazing.

**Mitigation Measures**

The BLM has identified the following mitigation measures to further reduce effects to livestock grazing:

- The BLM Rangeland Specialist and allotment permittees should be consulted to communicate timing and locations of activities.
- Gates used for access should be closed immediately after passing through them or cattle guards should be installed to restrict cattle movement.
- Temporary fencing should be placed if the integrity of allotment/pasture boundaries is affected by the Proposed Action. Fences and/or gates that are replaced should meet BLM standards.
- Exclusion fencing should be erected along revegetated disturbance in highly vulnerable areas to exclude livestock, accelerate reclamation of surface disturbances, and minimize weed infestations, and should be maintained until monitoring has determined that reclamation is successful. The BLM AO shall determine areas for potential exclusion.

#### 3.5.1.2.2 No Action Alternative

Under the No Action Alternative, impacts to grazing and rangeland resources from either the Proposed Action Alternative or Visual Alternative would not occur within the Project Area.

#### 3.5.1.2.3 Visual Alternative

Effects to grazing under the Visual Alternative would be similar to those described above for the Proposed Action. A potential 309.3 acres of surface land is identified for construction of 27 well pads and associated roads, of which about 219.4 acres are in grazing allotments on BLM-administered lands (see Map 3.5-1). No more than 20 of the 27 identified well pads would be constructed but all of the potential area identified within allotments could be disturbed (219.4 acres). A potential loss of up to 22 AUMs could occur if all 20 well pads are constructed on BLM-administered lands. After interim reclamation, up to 211.1 acres could remain disturbed throughout the Production/Operations Phase (based on 20 well pads constructed). Assuming potential disturbance could be 219.4 acres and approximately 33,827 allotment acres in the Project Area, 0.64 percent of the available AUMs in the Project Area could be affected and therefore, adjustments or reductions in permitted use on grazing allotments is not warranted.

Estimating an average of one AUM per 10 acres, approximately 1.4 percent of the available AUMs in the Project Area would be affected by the Visual Alternative and therefore, adjustments or reductions in permitted use on grazing allotments is not warranted.

#### 3.5.1.3 Cumulative Effects

Cumulative effects to livestock grazing within the CESA include: wildland fire, oil and gas exploration, recreation in the Bishop Creek Dam area, dispersed recreation (i.e., hunting, camping, etc.), and OHV use. These effects would continue under the No Action Alternative. As described above, the Proposed Action Alternative or the Visual Alternative would have an effect on grazing; however, with implementation of mitigation measures described above, cumulative effects to grazing are expected to be minimal.

### 3.5.2 RECREATION

#### 3.5.2.1 Current Conditions

The Project Area includes dispersed recreation such as fishing, upland game hunting, wildlife viewing, biking, hiking, and camping. The predominant activities are hunting and OHV travel. Chukar, dove, and greater sage-grouse are known to occur within the Project Area and are likely to be hunted on BLM-administered and private lands in the Project Area, with associated OHV use. Generally, the Nevada upland game season begins in September, and some species are available for harvest through February. Recreational OHV users also explore the area year-round on the primitive dirt roads, two-tracks, and trails extending throughout the Project Area.

The BLM Tabor Creek Recreation Area and campground are approximately 15 miles north of the Project Area on the west side of the Snake Mountain Range. Tabor Creek offers trout fishing, and the Snake Range is popular for mountain biking, hiking, hunting, and wildlife viewing. The area can be accessed using Upper Metropolis Road (CR 784) as well as Deeth-O'Neil Road (CR 753).

The Tabor Creek area serves as an important base camp for big game hunters. NDOW Wildlife Management Unit 075 encompasses the Project Area. Pronghorn and mule deer are commonly hunted in the management unit on uplands north of the Project Area. Approximately 306 mule deer were harvested in Unit 075 in 2012, along with 17 pronghorn, and 72 elk (NDOW, 2013). Because of habitat conditions, pronghorn hunting occurs to a larger degree than hunting for mule deer. Big game hunting seasons begin as early as August, with differing hunting methods extending the season through November.

Another important activity group is the CNHT visitors that come to the area to have a vicarious experience. Although this activity does not take up a large portion of the total usage for the area, a group could cover a large area in one visitor day due to the nature of the activity.

#### 3.5.2.2 Environmental Consequences

##### 3.5.2.2.1 Proposed Action Alternative

The Proposed Action may coincide with hunting seasons scheduled for Management Unit 075 during the Project's two year construction period. Hunter access to the area would not be restricted. It is likely that hunters would choose to temporarily avoid the area where drilling activities would be occurring because these activities could startle and displace game and generally impede the sport of hunting.

The construction and improvement of roads in the Project Area would likely increase access for OHV users. During construction, no other routes or ways would be closed to public access. Increased traffic and dust caused by construction could cause visitors enjoying dispersed recreation activities to relocate. Similar experiences abound within the Great Basin Region

rendering this impact to a negligible level. Despite increases in traffic during construction, activities at the Tabor Creek Recreation Area would be unaffected.

The CNHT experiences are primitive in nature and highly susceptible to changes in landscape conditions, which could dramatically impact the experience.

**Mitigation Measures**

The BLM has identified the following mitigation measure to further reduce potential impact to Recreation:

- Upon consultation with the BLM and area landowners, signs should be placed at key access points providing information addressing public safety, scheduling, and other issues associated with the Proposed Action.

#### 3.5.2.2.2 No Action Alternative

Under the No Action Alternative, there would be no impacts from either the Proposed Action Alternative or the Visual Alternative to recreation resources in the Project Area.

#### 3.5.2.2.3 Visual Alternative

Under this alternative visitor experiences associated with the CNHT would not be influenced to the same degree as under the Proposed Action because intrusions such as oil and gas infrastructure would not command the visitor's attention and would thereby preserve the trail experience. Six well pads (R-10N, R-21A, R-21K, R-27F, R-27I, and R-27M) and associated roads that would pose adverse visual impacts would not be constructed under this alternative and this would further preserve the recreational experience.

### 3.5.2.3 Cumulative Effects

Cumulative effects to recreation resources (i.e., hunting, camping, OHV use) within the CESA (watershed) include: wildland fire, oil and gas exploration, and grazing. These effects would continue under the No Action Alternative. As described above, the Proposed Action Alternative or Visual Alternative may have a small effect on recreation and therefore, additional cumulative effects are expected to be small.

## 3.5.3 LAND TENURE, RIGHTS OF WAY AND OTHER USES

### 3.5.3.1 Current Conditions

Several rights-of-way for roads, utilities, communication sites, and the railroad occur within the Project Area. These include an irrigation and water treatment plant, the historic railroad grade, Metropolis Road (Elko CR 754), two track and lightly improved secondary roads, the Southern Pacific Railroad, utility lines to the north and south, several buildings along Metropolis Road, and communication sites.

Specific rights-of-way within the Project Area include:

NVN-052546: Elko CR 753 Access Road ROW Grant
NVN-0-007217: Wells Rural Electric's Power Transmission Line ROW Grant
NVN-089748: Tetuan Resources Corporation's Access Road ROW Grant
NVN-042787: Sprint Communications' Buried Fiber Optic Cable ROW Grant
NVN-055614: BLM Elko District's Access Road #1490 ROW Grant
NVCC-0-00444693: Union Pacific Railroad Company's Deeth to Wells Railroad Line ROW Grant
NVE-0-003351: Metropolis Land Company's Reservoir and Irrigation facility ROW Grant

Table 3.5-2 lists the oil and gas leases within the Project Area.

**Table 3.5-2**
**Oil and Gas Leases within the Project Area**

| Lease Number | Location | Name |
|---|---|---|
| NVN88622 | T39N R60E, Sec. 24, 26 | Lonewolf Exploration & Production Co |
| NVN88625 | T39N R61E, Sec. 32, 34 | Lonewolf Exploration & Production Co |
| NVN86838 | T39N R61E, Sec. 20, 34, 35 | Lonewolf Exploration & Production Co |
| NVN88619 | T38N R60E, Sec. 2 | Lonewolf Exploration & Production Co |
| NVN88620 | T38N R60E, Sec 12 | Lonewolf Exploration & Production Co |
| NVN86575 | T38N R61E, Sec. 14 | Lonewolf Exploration & Production Co |
| NVN86991 | T38N R60E, Sec. 24 | Liberty Petroleum Corp. |
| NVN86576 | T38N R61E, Sec. 6, 7, 8 | Lonewolf Exploration & Production Co |
| NVN88623 | T38N R61E, Sec. 16, 18 | Lonewolf Exploration & Production Co |
| NVN74543 | T38N R61E, Sec. 14, 26, 34 | Tetuan Resources Corp. |
| NVN79487 | T38N R61E, Sec. 22, 28, 32 | Tetuan Resources Corp. |

### 3.5.3.2 Environmental Consequences

#### 3.5.3.2.1 Proposed Action Alternative

Rights-of-way grants and possibly temporary use permits could be required for road construction. Existing grant holders could be impacted by the Proposed Action but the impact would be minimized by use agreements with existing rights-of-way holders, authorized users, and any pipeline/transmission line operators prior to disturbance.

**Mitigation Measures**

The BLM has identified the following mitigation measure to further reduce potential impacts to existing right-of-way holders.

- Agreements allowing construction and maintenance should be obtained with all existing right-of-way holders, authorized users, and pipeline/transmission line operators prior to surface disturbance or construction of locations or access across or adjacent to any existing or approved rights-of-way or pipelines.

#### 3.5.3.2.2 No Action Alternative

Under the No Action Alternative, there would be no impacts from either the Proposed Action Alternative or the Visual Alternative to land uses, rights of way or other facilities in the Project Area.

#### 3.5.3.2.3 Visual Alternative

Effects to land uses, rights of way or other facilities in the Project Area would be the same under the Visual Alternative as those described above under the Proposed Action Alternative.

### 3.5.3.3 Cumulative Effects

Cumulative effects would occur as continued development in the area for rights-of-way and other uses is expected in the future. These effects would continue under the No Action Alternative. The Proposed Action Alternative or Visual Alternative would affect land tenure by construction and upgrading of roads and the requirement of new rights-of-ways; however, with implementation of the design features and mitigation discussed above, cumulative effects would not be substantial.

### 3.5.4 FIRE MANAGEMENT

#### 3.5.4.1 Current Conditions

Fire is a naturally occurring event in the Great Basin ecosystem. However, in the Elko District the frequency and rate of spread of fires has deviated from the historic norm. Fires are occurring with greater frequency and experiencing greater rates of spread. This is due in large part to invasive species (cheatgrass) creating an unnatural fuel load, continuity, and arrangement. This creates landscapes with monoculture of invasive species, in which native species have difficulty reestablishing.

Approximately 75 percent of Elko County is considered to be at high threat levels for the occurrence of large wildland fires (Wildland Fire Associates, 2008). This assessment is based on the vegetation types present, climate, and topography, as well as proximity to agricultural communities, wildlife habitat present, and the number of large-scale historic fires within Elko County. From 1980 through 2010, approximately 304 fires have occurred within 50 miles of the Project Area, ranging in size from less than one acre to more than 578,000 acres (BLM, 2008b). In 2007, the Hepworth Fire burned approximately 38,038 acres, of which approximately 760 acres burned within the northern portion of the Project Area (see Map 3.5-2). Although wildland fires may occur year-round in the BLM Elko Field Office Area, the fire season is generally considered to extend from May through September, with the height of the fire season in July and August (BLM, 2003).

Two BLM Fire Management Units (FMUs) occur within the Project Area including 35,821 acres of Marys River FMU and 3,623 acres of Wells Wildland Urban Interface FMU (BLM, 2009). The current fire management strategy in the BLM Elko District is full suppression of almost all fires (BLM, 2003). The BLM fire management strategy has been aggressively attacking and suppressing fires to prevent the establishment of invasive species.

#### 3.5.4.2 Environmental Consequences

##### 3.5.4.2.1 Proposed Action Alternative

Based on the volume of natural fuel present, recent large fires in the Project Area vicinity, and the high risk of fire potential in the Project Area (see Appendix B to Wildland Fire Associates, 2008), the Proposed Action could either ignite a fire or be susceptible to potential wildland fires.

Implementation of the Proposed Action could result in increased anthropogenic fire occurrence with increased use of passenger vehicles and heavy equipment operation or workers smoking on site. Wildfires from other areas could also spread into the Project Area, leaving well, structures, and Project equipment vulnerable to damage and/or destruction.

As part of their MSUPO, Noble has prepared and would follow their Fire Prevention Plan Measures applicable to all phases of the Project (Appendix J). With implementation of the fire prevention measures, the fire risk associated with the Project is low.

The Proposed Action may result in a beneficial effect in terms of providing greater access to the area for fire suppression and firebreaks (i.e., roads).

**Mitigation Measures**

The BLM has identified the following mitigation measure to further reduce effects to fire management:

- If a fire is caused by the Proposed Action, Noble should be responsible for fire suppression costs and rehabilitation of the damaged lands.

#### 3.5.4.2.2 No Action Alternative

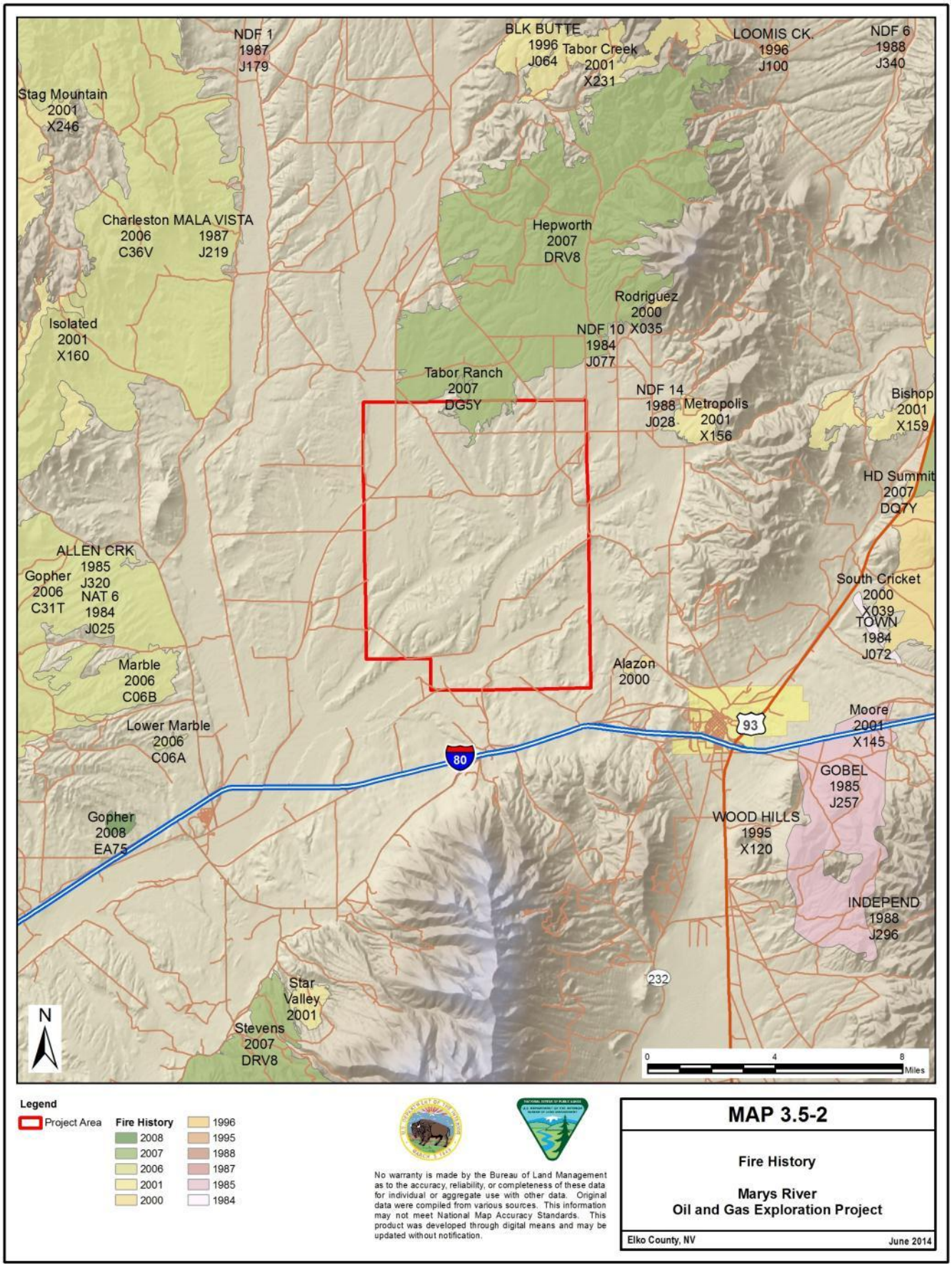
Under the No Action Alternative, there would be no impacts to fire management from the Proposed Action Alternative or the Visual Alternative.

#### 3.5.4.2.3 Visual Alternative

Effects to fire management under the Visual Alternative would be the same as those described above for the Proposed Action Alternative.

### 3.5.4.3 Cumulative Effects

Cumulative effects that could impact fire management within the CESA include: natural ignition, oil and gas exploration, dispersed recreation (i.e. hunting, camping, etc.), grazing, and OHV use. As described above, with implementation of Noble's Fire Protection Measures, and the mitigation measures described above, additional risks associated with fire, in combination with all other actions, are not expected to increase.

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**MAP 3.5-2**

**Fire History**

**Marys River**
**Oil and Gas Exploration Project**

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# CHAPTER 4 – TRIBES, INDIVIDUALS, ORGANIZATIONS, OR AGENCIES CONSULTED

The BLM sent letters (dated December 18, 2012) to or consulted with the following:

## Tribes

Battle Mountain Band Council
Confederate Tribes of the Goshute Indian Reservation
Duckwater Shoshone Tribe
Elko Band Council
Ely Shoshone Tribe
Shoshone Paiute Tribes of the Duck Valley Indian Reservation
South Fork Bank Council
Te-Moak Tribe of Western Shoshone
Wells Band Council
Yomba Shoshone Tribe

## Agencies

Nevada Department of Wildlife
Bureau of Indian Affairs
Western Shoshone Committee
Western Shoshone Defense Project
Western Shoshone Descendants of Big Smoky

# CHAPTER 5 – LIST OF PREPARERS

### BLM INTERDISCIPLINARY REVIEW

| NAME | TITLE | AREA OF RESPONSIBILITY |
|---|---|---|
| Bryan Fuell | Wells Field Manager | Field Manager |
| Bryan Mulligan | Assistant Field Manager<br>Project Lead | Invasive, Non-Native Species and Noxious Weeds, Waste, Transportation and Access |
| Alex Gardiner | Wildlife Biologist | Migratory Birds<br>Special Status Animal Species<br>Wildlife and Fisheries |
| Blaine Potts | Outdoor Recreation Planner | Recreation<br>Visual Resources Management |
| Aaron Mier | Assistant Field Manager, Renewable | Fire Management<br>Transportation and Access<br>Special Status Plant Species |
| Clint Mothershead | Lands and Realty Specialist | Land Tenure, Rights-of-Way, and Other Uses |
| Paula Thurston | Geologist | Geology and Minerals<br>Paleontology |
| Jeff Moore | Rangeland Management Specialist | Livestock Grazing |
| Mark Dean | Hydrologist | Air Quality and Climate<br>Soils, Hydrology |
| Wes Allen | Archaeologist | Cultural Resources<br>National Historic Trails<br>Native American Traditional Values |
| Julie Pierce | Socioeconomic Specialist | Environmental Justice<br>Socioeconomics |
| Dan Dzvirzdin | Rangeland Management Specialist | Vegetation |
| Victoria Anne | Planning and Environmental Coordinator | NEPA |

### Edge Environmental, Inc.

| Name | Resource/Responsibility |
|---|---|
| Mary Bloomstran | Project Manager, Document Control and Review, Wastes |
| Carolyn Last | Document Control and Review, National Historic Trails,<br>Native American Traditional Values |
| Jim Zapert<br>Susan Connell | Air Quality and Climate |
| Dan Duce<br>Robert Long | Soils |
| Terry Gulliver | Hydrology, Geology and Minerals |
| Nikie Gagnon | Hydrology, Land Tenure, Rights-of-Way, and Other Uses |
| Dwight Chapman<br>Archie Reeve | Migratory Birds<br>Wildlife and Fisheries<br>Special Status Animal Species<br>Special Status Plant Species<br>Vegetation<br>Invasive, Non-Native Species and Noxious Weeds |
| Sandra Goodman | Socioeconomics, Transportation and Access, Environmental Justice |
| Josh Moro | Visual Resources Management, Recreation, Fire Management |
| Cultural Resource Analysts, Inc. | Cultural |

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# Appendix A

# Transportation Plan

# Appendix B

# BLM's Response to Public Comment

# Appendix C

# Lease Stipulations

# Appendix D

# Typical Drawings

# Appendix E

# Narrative of Completion and Stimulation

# Appendix F

# Memorandum of Understanding – Aqua Program

# Appendix G

# Mary River Reclamation Plan

# Appendix H

# Marys River Integrated Weed Management Plan

# Appendix I

# Marys River Noise Monitoring Data

# Appendix J

# Fire Prevention Plan Measures

# Appendix K

# Greater Sage-Grouse Management Plan

# Appendix L

## Noxious Weeds Included on the Nevada Noxious Weed List

# Appendix M

# Species Common and Scientific Names

# Appendix N

# Bird Species Reported on National Biological Survey Breeding Bird Survey Routes within 100 Miles of the Marys River Project Area, 1992 to 2011